Documents of NFLSHS-China Integrated Human Practices

To make our iHP work more standardized and to make it valuable for the subsequent team, we have compiled all the HP works related to interview into a document for easy reference, and showing what we have gotten from each person we interviewed.

Content

1. Questionnaire designed for the public

Chinese Version

1) 您的性别是什么?

2) 您听说过虾青素吗?

3) 您经常使用护肤品吗?

4) 您在意自己的皮肤状况吗?

5) 您是否曾因价格过高而放弃购买护肤品?

6) 您经常使用红色化妆品（例如口红、腮红、眼影）吗?

7) 您是否曾因使用化妆品而出现皮肤问题?

8) 您能接受转基因生物吗?

9) 如果我们利用基因工程降低虾青素相关护肤品的价格，您会购买吗?

English Version

1) What is your gender?
2) Have you ever heard of Astaxanthin?
3) Do you often use skincare products?
4) Do you care about the condition of your skin?
5) Have you ever given up buying skincare products because of thehigh prices?
6) Do you regularly use red cosmetics(e.g., lipstick, blush, eyeshadow)?
7) Have you experienced skin problems possibly related to cosmetic use?
8) Do you accept genetically modified organisms?
9) If we use genetic engineering to reduce the price of Astaxanthin-related skincare products, would you buy them?

2. Street interviews with Shenzhen citizens

Q1. 请问您会关注面部皱纹的情况吗?

Would you be concerned about facial wrinkles?

Q2. 请问您会因为皱纹而选购抗衰护肤品吗?

Would you purchase anti-aging skincare products because of wrinkles?

Q3. 请问您是否了解过虾青素及其效果?

Have you heard of astaxanthin and its effects?

Q4. 请问您是否可以接受合成生物学技术生产的虾青素所制成的护肤品?

Would you accept skincare products made from astaxanthin produced by synthetic biology technology?

3. Interview with an Opera Performer

Q1. 请问红色系的彩妆在戏剧化妆时的有多常见？它在整个妆面中的重要性又是如何呢？

几乎每一个角色都会有，除了净角不会有，眼影，唇还有腮红；会起到画龙点睛的作用，其他都是肉色和黑色的，会看起来比较有精神，对观众比较吸睛。

Q2. 演出后面部是否有痒痛、红肿、水泡等过敏症状？用完油性彩妆后会不会出现没有清洗干净残留颜料的情况？

有时候卸完妆会感到脸部有点痒，有一些人皮肤比较敏感可能会出现过敏症状；

Q3. 经常表演的话使用这些彩妆脸上要是不舒服的话你们会采用什么方法或者使用什么化妆品应对呢？

一般买那种比较温和保湿的卸妆油和洗面奶，使用精华液或者贴面膜来保护肌肤

Q4. 请问你们对虾青素的抗氧化功效有什么看法？此前对虾青素抗氧化化妆品或者护肤品有了解吗？

化妆品要用到戏剧油彩，非常干燥，皮肤容易失水，化妆前会上水乳和隔离霜（都要有比较强的抗氧化功效），虾青素优比其他一些常见的类胡萝卜素更好的抗氧化功效，虾青素有亲水亲油性，和皮肤差不多，可以穿透细胞膜，和人体皮肤的一个屏障，可以比较有效的清楚人体里的自由基，如果市面上有虾青素化妆品还是很愿意选择的，此前戏剧行业并没有虾青素化妆品

Q5. 如果要选择虾青素化妆品你们愿意选择哪种形式的？

水乳或者精华液

Q6. 你们愿意相信新上市的创新抗氧化护肤品还是老牌护肤品？

愿意相信的，因为此前并没有这种类型的护肤品出现

Q1. How common are red-toned makeup products in theatrical makeup? And what is their significance in the overall makeup?
Almost every character will have them, except for the lead roles. Eye shadow, lip color, and blush; they play a crucial role in highlighting the features. The rest are in neutral colors and black, which make the face look more energetic and attract the audience's attention.

Q2. Do you experience itching, pain, redness, blisters or other allergic symptoms after the performance? Will there be a situation where residual pigments remain on the skin if the oily makeup is not washed off properly?
Sometimes, after removing the makeup, the face feels a bit itchy. Some people with sensitive skin may experience allergic symptoms.

Q3. If you perform frequently and if using these makeup products makes your face uncomfortable, what methods or cosmetics will you use to deal with it?
Generally, use gentle moisturizing makeup remover oil and facial cleanser. Use essence or apply masks to protect the skin.

Q4. What do you think of the antioxidant effect of astaxanthin? Have you previously known about antioxidant cosmetics or skin care products containing astaxanthin?
Cosmetics need to use theatrical oil-based makeup, which is very dry and the skin is prone to dehydration. Before applying makeup, you will apply lotion and sunscreen (all of which should have strong antioxidant effects). Astaxanthin has better antioxidant effects than some other common carotenoids. Astaxanthin is hydrophilic and lipophilic, similar to the skin, and can penetrate the cell membrane and the barrier of the human skin, effectively clearing free radicals in the body. If there are astaxanthin cosmetics on the market, I would be willing to choose them. Previously, there were no astaxanthin cosmetics in the theatrical industry.

Q5. If you have to choose an astaxanthin cosmetic, which form would you prefer?
Lotion or essence.

Q6. Would you prefer the newly launched innovative antioxidant skin care products or the established ones?
I would prefer the new ones because there haven't been such types of skin care products before.

4. Interview with the Shenzhen Institute of Synthetic Biology

Q1. 您能简要介绍一下光明科学城核心区的合成生物成果转化专业园区吗?

光明科学城核心区的合成生物成果转化专业园区是粤港澳大湾区生物医药产业的重要载体，依托光明科学城与大湾区政策优势，定位为全国首个合成生物成果转化专业园区，构建“生产、生活、生态”三生融合的科研经济生态体系。

Q2. 您能解释一下为什么选择发酵路线来实现虾青素的工艺化生产吗?

选择发酵路线来实现虾青素的工艺化生产，是因为发酵技术是细胞工厂技术中获得下游产品必不可少的部分。

Q3. 目前发酵方法有哪些?

目前较为成熟的发酵罐培养技术：其具有高效搅拌与通气系统，实现均匀混合和高效传氧效率；能够精准控温，确保菌体在最佳生长温度；配备在线pH和自动溶氧探头，实现发酵过程闭环控制。

Q4. 您能描述一下目前菌株的量产方式吗?

目前菌株的量产方式包括利用动态调控策略，这是一种高效的细胞工厂工程化代谢改造策略，可以提高细胞工厂的性能。

Q5. 在量产过程中，您认为可能会遇到哪些风险?

在量产过程中可能会遇到的风险包括发酵罐技术中任何一环出现故障，如搅拌、通气、温度控制或pH控制等，都容易导致大规模培养失败。

Q1. Could you briefly introduce the specialized park for synthetic biological technology transformation in the core area of Guangming Science City?

The specialized park for synthetic biological technology transformation in the core area of Guangming Science City is an important carrier of the biopharmaceutical industry in the Guangdong-Hong Kong-Macao Greater Bay Area. Relying on the policy advantages of Guangming Science City and the Greater Bay Area, it is positioned as the first specialized park for synthetic biological technology transformation in China, and builds a scientific and economic ecological system integrating "production, life, and ecology".

Q2. Could you explain why the fermentation route was chosen to achieve the industrial production of astaxanthin?

The fermentation route was chosen for the industrial production of astaxanthin because fermentation technology is an indispensable part of cell factory technology for obtaining downstream products.

Q3. What are the current fermentation methods?

The currently matured fermentation tank cultivation technology: It has an efficient stirring and ventilation system, achieving uniform mixing and efficient oxygen transfer efficiency; it can precisely control temperature to ensure the bacteria grow at the optimal growth temperature; it is equipped with online pH and automatic dissolved oxygen probes to achieve closed-loop control of the fermentation process.

Q4. Could you describe the current production method of the strain?

The current production method of the strain includes using dynamic control strategies, which is an efficient engineering metabolic modification strategy for cell factories, capable of improving the performance of cell factories.

Q5. What risks do you think might be encountered during the production process?

During the production process, the risks that might be encountered include any failure in any part of the fermentation tank technology, such as stirring, ventilation, temperature control or pH control, which can easily lead to the failure of large-scale cultivation.

5. Interview with Professor Wang Chaogang from the field of molecular science

Q1. 您能否分享关于细胞工厂设计的见解吗?

王教授强调，设计好一个细胞工厂主要要关注“合适的底盘、合适的基因元件、良好的通路设计、适宜的培养条件。”这些要素是构建高效细胞工厂的关键。

Q2. 我们现在纠结于选择大肠杆菌还是酵母菌作为我们的底盘，您有什么建议吗?

我建议你们考虑用大肠杆菌作为你们的底盘。选择大肠杆菌作为细胞工厂底盘的原因包括其分裂速度快、基因编辑容易、代谢通路简单以及工业化工艺成熟。大肠杆菌分裂速度快，约20分钟一次，远快于酵母或藻类，有利于快速生产。基因编辑操作相对简单，大肠杆菌本身不产生虾青素，也不存在藻类或酵母中的旁路，只需引入少数几个关键通路基因即可，避免了敲除旁路的复杂性。此外，大规模工业化生产工艺非常清晰和成熟。

Q3. 我们使用一个T7启动子表达七个基因过于耗时耗钱，请问有什么更好的方法吗?

使用T7启动子表达多个基因的方法可以简化操作，但一个启动子最多带五个基因，并且越往后表达效率就越低。你们可以思考优化基因线路。用双T7启动子表达7个基因效果应该会更好，你们可以做湿实验试一下。

Q1. Could you share your insights on the design of cell factories?

Professor Wang emphasized that designing a good cell factory mainly involves focusing on "the appropriate chassis, suitable genetic elements, good pathway design, and suitable culture conditions." These elements are key to building an efficient cell factory.

Q2. We are currently struggling with choosing between E. coli and yeast as our chassis. Do you have any suggestions?

I suggest you consider using *E. coli* as your chassis. The reasons for choosing *E. coli* as the chassis for a cell factory include its fast division rate, ease of genetic editing, simple metabolic pathways, and mature industrial processes. *E. coli* divides rapidly, approximately every 20 minutes, which is much faster than yeast or algae, facilitating rapid production. Genetic editing is relatively simple, and *E. coli* does not naturally produce astaxanthin and does not have the bypasses found in algae or yeast. Only a few key pathway genes need to be introduced, avoiding the complexity of knocking out bypasses. Additionally, large-scale industrial production processes are very clear and mature.

Q3. Using a T7 promoter to express seven genes is too time-consuming and costly. Do you have any better suggestions?

The method of using a T7 promoter to express multiple genes can simplify operations, but one promoter can carry at most five genes, and the expression efficiency decreases as more genes are added. You can consider optimizing the genetic circuit. Expressing seven genes with a dual T7 promoter should be more effective. You can try it out with a wet experiment.

6. Interview with Professor Wang Jiangxin from the field of synthetic biology

Q1. 从大肠杆菌中提取虾青素的时候，破壁技术对产物活性会有影响吗，如果有的话影响有哪些?

物理方式有压榨超声波，但这个会导致结构变化，使活性高的全反式异构体转变为活性低的顺式异构体；化学方式有酶解，但是这个可能改变虾青素的结构。破壁技术中需要重点考虑温度，温度在四十摄氏度到六十摄氏度的高温破壁有可能因为温度过高伤害产物活性，你们可以选择低温破壁是可以保证有效成分的稳定，最好的情况可以保留98%的活性。

Q2. 工程菌常堆积番茄红素（红色），藻类如何避免中间产物滞留？我们需优化哪些酶的表达比例?

发酵产物时很容易引起旁路阻断，你们可以思考如何引导代谢流向下游。

Q3. 我们想进一步优化虾青素的表达量，如果用基因编辑技术，我们应如何选择合适的基因?

目前生产虾青素，效果最好的基因是来自雨生红球藻的*CrtZ*，*CrtE*，你们可以编辑这两个基因替代原有基因到你们的表达通路中，看看虾青素产量是否会提高。除此之外，你们可以考虑一下定向突变技术，就是对通路中合适的酶进行氨基酸突变，提高酶的催化效率从而提升虾青素的产量。

Q1. When extracting astaxanthin from Escherichia coli, does the cell wall disruption technique have an impact on the activity of the product? If so, what are the impacts?

Physical methods include pressing and ultrasonic waves, but these can cause structural changes, converting the highly active all-trans isomer into the less active cis isomer; chemical methods include enzymatic hydrolysis, but this may alter the structure of astaxanthin. In the cell wall disruption technique, temperature is a key factor to consider. High-temperature disruption at 40 to 60 degrees Celsius may damage the activity of the product due to excessive heat. You can choose low-temperature disruption to ensure the stability of the active components, and in the best case, retain 98% of the activity.

Q2. Engineering bacteria often accumulate lycopene (red), how can algae avoid the accumulation of intermediate products? Which enzymes' expression ratios should we optimize?

During fermentation, it is easy to cause side-path blockage. You can think about how to guide the metabolic flow to the downstream.

Q3. We want to further optimize the expression level of astaxanthin. If we use gene editing technology, how should we select the appropriate genes?

Currently, the best genes for astaxanthin production are *CrtZ and CrtE* from *Haematococcus pluvialis*. You can edit these two genes to replace the original genes in your expression pathway and see if the astaxanthin yield increases. In addition, you can consider directed mutation technology, which involves amino acid mutations in suitable enzymes in the pathway to improve the catalytic efficiency of the enzymes and thereby increase the astaxanthin yield.

7. Interview a doctor from the hospital's plastic surgery department

Q1. 人到中年以后衰老的会特别快，请问衰老和人体内的什么有关？我们怎么才能延缓衰老的进程?

和人体内的自由基有关，随着年龄增加，人体内的自由基也会增加造成皮肤暗沉以及出现斑点。其次，人体内的胶原蛋白也会流失造成皮肤的松弛下垂

Q2. 虾青素具有抗衰老的功效，像虾青素这样被研究证实拥有强大抗氧化能力的成分，是否能够作为一款有效的抗衰老护肤成分?

可以的，虾青素抗衰老的功效比维生素C以及亚麻籽油还要高很多倍,只要剂量把握好并且注意过敏人群（比如对于藻类过敏的人群）

Q3. 对于虾青素，如果我们把它添加到面膜中，怎样才能让它那么容易流失呢?

虾青素放到精油里，更好的保护成分，让它不随着水分减少而干燥，让皮肤吸收得更充分

Q4. 如果我们能有一种技术，可以稳定、高效地提供虾青素，这对于开发新一代的抗衰老产品来说，是不是一个非常有价值和前景的方向?

是的，因为虾青素可以保湿护肤也可以增强皮肤的屏障作用，减少炎症反应。我们可以将虾青素添加进防晒霜，使防晒霜具有更好的保湿护肤能力，并且对于紫外线有更好的防护修复作用

Q5. 我们市面上有哪些抗氧化的彩妆、美容护肤品？他们分别会有哪些缺点？我们怎么才能才能变得更有竞争力对比这些厂家?

午休堂里有一款面膜添加了虾青素；通过检测，选择好的平台去检测；控制好剂量，做好肌肤检测，寻找市面上对产品成分可能会过敏的人群（e.g.老人以及幼童）；产品的质量要过关，营销方式要得到大家认可，可以使用流量来引流自己的产品，利用社交媒体平台来宣传

Q6. 我们应该如何使用虾青素才能使它的效果最大化？口服还是外敷比较合适?

口服更合适但是要把握好量

Q7. 虾青素用于彩妆和护肤的产品中是否对皮肤有不利的影响？比如过敏、炎症等?

虾青素对角质层可能还会对角质层染色，要把握量，但是染色后对于皮肤并没有什么危害（只要是不对藻类过敏性的肌肤），是短暂性的

Q8. 目前市面上的虾青素彩妆和护肤品都有哪些分类和品种？我们要是想打造独一无二的产品应该从哪些方面去考虑呢?

不太清楚，不多；从彩妆方面去考虑，因为将虾青素添加到彩妆里的产品很少

Q9. 虾青素护肤品作用在人体上一般需要多久才能看到效果？目前有比较好的方法缩短生效时间吗?

因人而异，与服用的量以及个人体质有关；口服的生效时间更短，但想要让虾青素生效于指定位置还是可以选择面膜，在面膜朝内的一面用精油包裹虾青素吸收效果会更好，还可以把虾青素放进水光针里，拿到国家的械字号使用

Q10. 虾青素对于医美行业是否会有帮助?

有的，虾青素对于术后修复（e.g.光电治疗）有帮助，对于皮肤表层的抗氧化效果很好

Q1. Aging occurs particularly rapidly after middle age. What is related to aging in the human body? How can we delay the aging process?

It is related to free radicals in the body. As people age, the number of free radicals in the body also increases, causing dull skin and the appearance of spots. Secondly, collagen in the body also decreases, causing skin to become loose and sag.

Q2. Astaxanthin has anti-aging effects. Components like astaxanthin that have been proven to have strong antioxidant capabilities can they be used as an effective anti-aging skin care ingredient?

Yes, astaxanthin's anti-aging effects are many times higher than those of vitamin C and flaxseed oil. As long as the dosage is controlled and people with allergies (such as those allergic to algae) are taken into consideration.

Q3. If we add astaxanthin to a mask, how can we make it easily absorbed?

Put astaxanthin in essential oil for better protection, so that it doesn't dry out as the moisture decreases, allowing the skin to absorb it more fully.

Q4. If we have a technology that can provide astaxanthin stably and efficiently, is this a very valuable and promising direction for developing a new generation of anti-aging products?

Yes, because astaxanthin can moisturize the skin and enhance the skin's barrier function, reducing inflammatory reactions. We can add astaxanthin to sunscreen to make it have better moisturizing and skin care capabilities, and better protect against UV rays.

Q5. What antioxidant makeup and beauty products are available on the market? What are their disadvantages? How can we become more competitive compared to these manufacturers?

At Huizhiting, there is a mask that adds astaxanthin; through testing, select a good platform for testing; control the dosage, do skin tests, look for people who may be allergic to product ingredients in the market (e.g. the elderly and children); the product quality must be reliable, the marketing method must be recognized by everyone, and we can use traffic to promote our products, use social media platforms to promote.

Q6. How should we use astaxanthin to maximize its effect? Is it better to take it orally or apply it externally?

Oral use is better, but the dosage must be controlled.

Q7. Is there any adverse effect of astaxanthin in cosmetic and skincare products on the skin? Such as allergies, inflammation, etc?

Astaxanthin may also stain the stratum corneum, but the staining is harmless to the skin (as long as it is not allergic to algae), and it is temporary.

Q8. What are the classifications and varieties of astaxanthin cosmetics and skincare products on the market? What aspects should we consider when creating a unique product?

Not clear, not many; considering from the cosmetic aspect, because products with astaxanthin added to cosmetics are rare.

Q9. How long does it take for astaxanthin skincare products to show effects on the human body? Are there any better methods to shorten the effect time?

It varies from person to person, related to the dosage taken and personal constitution; the effect time for oral use is shorter, but if you want to make astaxanthin effective at a specific location, you can choose a mask. Wrapping astaxanthin with essential oil on the inner side of the mask will have a better absorption effect, and you can also put astaxanthin in a water light injection, and use it with a medical registration number from the state.

Q10. Will astaxanthin be helpful to the medical beauty industry?

Yes, astaxanthin is helpful for post-operative repair (e.g. photoelectric treatment), and has a good antioxidant effect on the skin surface.

8. Discussion with Biosysen Biotechnology regarding entrepreneurship promotion

Q1. 请问你们认为利用合成细胞工厂生产产品原料对于社会有什么有益效果或者可能受到的阻碍呢？（会有伦理方面的问题吗？）

利用合成细胞工厂生产产品原料对社会的有益效果包括环境保护和先进材料的开发。例如，通过基因改造微生物，可以使其能够净化水源、土壤和空气，从而在环境保护中发挥作用。不过合成生物学的发展也带来了挑战和风险。科学与社会争议、伦理问题、生物安全风险以及风险评估与管理是合成生物学面临的主要挑战。例如，合成生物学的伦理问题包括对身体的伤害和对非身体的伤害两大类。

Q2. 请问你们在实验过程中是否有考虑成本问题？如果成本超标，你们一般会从哪几个角度考虑去优化?

通过优化合成路线，提高生产收率和效率，减少生产步骤和操作，降低产品成本。确保细胞在整个预期生长期间提供稳定的产量和质量，改进细胞系开发，提高蛋产量

Q3. 如果实验结果不理想，你们会从哪几个方面去改进，改进的大体方向又是什么?

试错，要一点一点排除的，一个不行就做一百个。

Q4. 涉及“群众是否能接受基因编辑的食品”问题时，你们是如何推广商品，如何消除人们的顾虑的？如何宣传才能使群众对产品的安全性放心?

很难，吃了太多亏，例如镭，冰毒作为候选药物被做出来，生物技术要用，但是要谨慎地用。美国做了认证，是一个社会现状，要跟着社会节奏走，积极推广宣传，技术安全不能讲，但是可以保证产品安全，有竞争力。

Q5. 请问你认为你们企业的利益相关者有哪些?

要在全球都找到自己的位置，小到不同企业，大到各个国家。处在一个行业的转折点上，技术升级，生物从手艺到工艺，要分工，从设计到量产都要考虑到。

Q6. 请问你们在与工业企业合作时，最常收到的来自合作伙伴的需求或顾虑是什么?

更低的成本更高的效率，生物制造替代化学制造，开发全新的东西在于如何真的做出来，科学是个爱好。

Q7. 对于合成生物学创业公司来说，如何平衡短期商业回报与长期技术投入?

从公司角度来讲，要平衡产品投入，短周期产品和长周期产品互补。

Q8. 能否分享一个你们公司成功将技术转化为商业化产品的案例？从技术验证到市场落地经历了哪些关键阶段?

啤酒，商业比底物更重要。记住要有想法，要有计划，要做社会调查，从实验室到工业化，把链条一个一个打通。

Q1. Could you please tell us what beneficial effects the production of raw materials for products through synthetic cell factories may have on society, and what obstacles might they encounter? (Are there any ethical issues involved?)

The beneficial effects of producing raw materials for products through synthetic cell factories on society include environmental protection and the development of advanced materials. For example, by genetically modifying microorganisms, they can be made to purify water, soil, and air, thus playing a role in environmental protection. However, the development of synthetic biology also brings challenges and risks. The main challenges faced by synthetic biology include scientific and social controversies, ethical issues, biological safety risks, and risk assessment and management. For example, the ethical issues of synthetic biology fall into two categories: harm to the body and harm to non-bodily entities.

Q2. Could you please tell us if you have considered the cost issue during the experiment? If the cost exceeds the limit, what aspects would you generally consider to optimize it?

By optimizing the synthesis route, increasing the production yield and efficiency, reducing the production steps and operations, and lowering the product cost. Ensure that the cells provide stable output and quality throughout the expected growth period, improve the development of cell lines, and increase egg production.

Q3. If the experimental results are not satisfactory, from which aspects would you improve and what is the general direction of the improvement?

Trial and error, one has to eliminate one by one. If one doesn't work, do a hundred.

Q4. When dealing with the issue of whether the public can accept genetically edited food, how do you promote the product and how do you eliminate people's concerns? How can you promote it in a way that makes the public confident in the safety of the product?

It's very difficult. We have suffered too many losses. For example, radium, methamphetamine as a candidate drug was developed, and biotechnology needs to be used, but it should be used cautiously. The United States conducted certification, it is a social reality, we need to follow the social rhythm, actively promote and publicize, the technical safety cannot be discussed, but the product safety can be guaranteed, and it is competitive.

Q5. Could you please tell us what the stakeholders of your enterprise are?

To find your position globally, from small enterprises to various countries. At a turning point of an industry, technological upgrading, biology from craftsmanship to process, division of labor is needed, from design to mass production, all need to be considered.

Q6. Could you please tell us what the most common demands or concerns from partners are when you collaborate with industrial enterprises?

Lower cost and higher efficiency, biological manufacturing replacing chemical manufacturing, developing new things lies in how to really make it. Science is a hobby.

Q7. For synthetic biology start-up companies, how to balance short-term commercial returns and long-term technological investment?

From the perspective of the company, it is necessary to balance product investment, short-cycle products and long-cycle products are complementary.

Q8. Could you please share a case of your company successfully converting technology into commercial products? What key stages did you go through from technology verification to market implementation?

Beer, commerciality is more important than the substrate. Remember to have an idea, have a plan, conduct social surveys, connect the chain one by one from the laboratory to industrialization.

9. Discussion with Consumer Testing Technology Co., Ltd. regarding cosmetics laws and regulations

Q1. 可以请你们介绍一下你们企业目前进行的业务有哪些吗?

我们致力于为化妆品企业提供覆盖产品全生命周期的专业服务，包括：

1、化妆品安全合规检测服务：依据《化妆品安全技术规范》 提供全套安全检测服务。①涵盖产品全项检测（理化、微生物、毒理学等）。②重点检测禁用物质、限用物质（如重金属、激素、抗生素等）。③精准检测准用防腐剂、准用防晒剂 等限用成分的含量及合规性。

2、化妆品功效评价服务：拥有专业的化妆品功效实验室。提供全面的功效评价解决方案：①人体功效评价试验：通过志愿者测试评估产品宣称功效（如祛斑美白、防晒防脱发、修护、祛痘、滋养等）。②消费者使用测试：收集目标消费者在实际使用场景下的感官评价和效果反馈。③实验室试验（体外功效实验）：利用细胞、组织或仪器模型进行功效成分或配方的初步筛选和机制研究。

3、出口化妆品合规测试服务：支持产品出口全球市场，熟悉并依据主要国际法规标准进行检测；①国际标准：如 ISO 系列标准。②地区药典：包括 欧洲药典 (EP)、美国药典 (USP) 等要求。

4、化妆品注册备案代理服务：提供国产化妆品及进口化妆品注册/备案的全流程专业代办服务。熟悉中国国家药品监督管理局（NMPA）法规要求，协助企业高效完成申报材料的准备、提交与沟通。

Q2. 请问现今国家对于化妆品行业有哪些管制政策?

1.政府监管与安全标准：化妆品行业受到严格的政府监管，许多国家建立了严格的化妆品注册制度，要求产品在上市前经过专业评审，确保成分安全无害。例如，国家药品监督管理局（NMPA）对化妆品实施注册和备案制度，并对禁用原料目录进行更新，禁止使用大麻类原料等。

2.成分与功效宣传的规范：化妆品的成分和功效宣传受到严格限制，以防止夸大宣传和误导消费者。例如，国家药监局明确禁止宣称含有“干细胞”和“食品级”的化妆品，并对相关产品进行清理整治。

3.网络经营监管：为加强化妆品网络销售的监管，国家药监局出台了《化妆品网络经营监督管理办法》，要求平台内经营者全面、真实、准确、清晰、及时披露产品信息，确保与注册或备案资料一致。

4.安全评估与风险监测：自2025年5月1日起，化妆品注册备案全面实施完整版安全评估制度，强化风险防控体系，推动监管从“事后处置”迈向“事前预防”。

5.原料创新与支持政策：国家药监局发布的《支持化妆品原料创新若干规定》为原料创新提供政策保障，鼓励企业加大研发投入。

Q3. 请问化妆品注册最应该注意什么？化妆品产品进入市场需要经过哪些质量检测?

一、化妆品注册最应该注意以下几点：

1、产品质量安全：确保产品符合国家相关标准，不得含有禁用物质或超标限用物质。

2、成分合规性：化妆品成分需符合法规要求。

3、包装标识与宣传真实性：标签信息必须清晰、规范；宣传内容应真实、准确，与产品实际成分和效果相符。不得有虚假宣传或误导消费者的内容。

4、科学依据：提供毒理学测试报告、功效成分研究报告等科学依据，以证明产品的安全性和有效性。

5、安全评估：根据《化妆品安全评估技术导则（2021年版）》，对原料和产品进行安全性评估，确保在正常、合理使用条件下不会对人体健康造成危害。

6、资料准备与流程合规：资料完整性、流程规范，确保资料真实、准确、完整。配合监管部门核查，提供整改资料或接受现场检查。

这些注意事项有助于确保化妆品注册的合规性和安全性，避免法律风险和市场问题。

二、化妆品产品进入市场需要经过一系列严格的质量检测，这些检测贯穿于研发、生产、上市前以及上市后的全过程。

1、出厂检测（企业自检/型式检验）

性质：由生产企业自行或委托有资质的实验室进行，是每批次产品出厂前必须进行的质量控制。检验依据为产品执行标准。

2、上市前检测（备案/注册检验）

性质：为满足产品注册或备案要求，由化妆品注册人、备案人委托国家药品监督管理局认定的化妆品注册和备案检验机构进行的检测。检验依据为《化妆品注册和备案检验工作规范（2019年 第72号）》。

3、安全评估报告

虽然不完全等同于“检测”，但这是上市前极其关键且强制要求的一环。

4、上市后的抽检与市场监管

产品上市后，国家药监局及各级药品监督管理部门会持续进行市场监督检查和抽样检验。

因此，化妆品从生产到上市，需要经过出厂检测（批次控制）+ 上市前检测（合规准入）+ 安全评估（综合研判）三大核心环节的质量安全把关，并在上市后接受持续的市场监管抽检。每个环节都至关重要，缺一不可。企业在实际操作中务必严格遵守国家最新法规要求。

Q4. 请问在生产过程中我们怎样才能最大限度地保证产品质量的安全性?

1、严格遵守法律法规和行业标准

2、加强原料采购与供应商管理

3、规范生产工艺流程

4、强化生产环境与设备管理

5、实施全面的质量检测体系

6、建立追溯与召回制度

7、加强员工培训与质量文化建设

8、持续改进与风险评估

通过以上措施，化妆品生产企业可以在生产过程中最大限度地保障产品质量的安全性，确保消费者使用的化妆品安全可靠。

Q5. 我们利用大肠杆菌去生产虾青素并作为原料加入化妆品，请问虾青素化妆品中虾青素的含量应保持在多才能符合标准?

根据中检院在2025年2月9日更新的《已上市产品原料使用信息》中，虾青素在全身驻留类、眼部驻留类产品的使用量为3%。根据《已上市产品原料使用信息》参照使用原则，相同使用方法的同一原料，可按照全身、躯干部位、面部（含颈部）、手足、头部、头发、口唇、眼部、指（趾）甲的顺序，后面作用部位可参照前面作用部位的原料使用量。淋洗类产品可参照驻留类使用。

若产品中虾青素添加的使用量超过3%，则需要按照《化妆品原料数据使用指南》查找是否还有其他可用于安全评估的证据类型；若无可用证据类型，则需要参照下列方法确保原料毒理资料齐全，证明原料的安全性：

1.《化妆品安全评估技术导则（2021年版）》风险评估程序（4步法）

2.《毒理学关注阈值（TTC）方法应用技术指南》

3.《交叉参照（Read-across）方法应用技术指南》

Q6. 我们想要将生产的虾青素添加到化妆品（e.g.面膜/面霜/精油等）中，现在市面上有哪些方法可以确保产品在较长的时间内不变质，（如果提到了防腐剂：那么请问我们具体添加防腐剂的剂量应该控制在多少才算合格产品？）

虾青素本身稳定性较差，容易受到光、热、氧气、pH等因素的影响而失活褪色，需要在生产和运输储存过程中尽量减少上述因素的影响，可以从原料、配方、工艺方面考虑：

1.选择脂质体、乳液、微/纳米颗粒等合适的载体或采用包结络合技术将虾青素包裹其中，保护其免受外界环境影响。

2.添加抗氧化剂

曲克芦丁：曲克芦丁是一种植物黄酮-芦丁的衍生物，具有抗氧化、光保护等功效，能有效减缓虾青素的褪色程度。（根据《已上市产品原料使用信息》，曲克芦丁在全身驻留类使用量为2%，眼部驻留类使用量为3%

3.控制配方体系

（1）避免与还原剂共存：虾青素在酸性条件下易被还原剂还原，因此在配方中应避免与维生素C等还原剂共存。

（2）控制pH值：虾青素在酸性条件下稳定性较好，在化妆品中的pH范围一般在5.5-6.2。不建议与强酸（如果酸、水杨酸）、强碱（如皂基）同时使用，因为强酸强碱会破坏虾青素的结构，影响其功效。

（3）避免与金属离子共存：虾青素在酸性条件下易与金属离子形成络合物，因此在配方中应避免与金属离子共存，如铜胜肽等成分。

4.控制生产环境：在生产过程中，严格控制温度、湿度和光照条件。一般温度应控制在25℃以下，湿度在40%-60%之间，避免在强光下进行生产操作。

5.使用遮光密封包装：虾青素对光敏感，易发生光降解。采用遮光性能好的包装材料，如深色玻璃瓶、铝箔袋等，能有效阻挡紫外线和可见光，减少虾青素的光氧化，延长产品保质期。确保包装的密封性良好，

防止空气、水分和微生物进入。可使用真空包装、充氮包装等技术，降低产品与空气的接触，抑制氧化反应和微生物滋生。

Q7. 我们正在研究的虾青素在化妆品、食品保健、药品、饲料等都有涉及，请问在产品研发过程中如何平衡不同产品类型的创新投入与市场需求?

1.全面了解市场现状：对化妆品、食品保健、药品、饲料等各个市场进行深入调研，了解各市场的规模、增长趋势、竞争格局、消费者偏好等。例如，化妆品市场对虾青素的需求可能更注重其抗氧化、抗衰老、防晒等功效，而饲料市场则更关注其对动物生长、繁殖、免疫力提升等方面的作用。

2.精准定位目标客户：明确不同产品类型的目标客户群体。如化妆品的虾青素产品主要面向注重皮肤保养的中高端消费者；食品保健产品可能面向关注健康、追求高品质生活的中老年人群；药品则主要针对有特定疾病或健康问题的患者群体；饲料产品则面向水产养殖、家禽养殖等领域的养殖户。

3.根据市场需求分配资源：如果某个产品类型市场需求大、增长潜力高，可适当增加创新投入，如在化妆品领域，若消费者对虾青素抗衰功效需求旺盛，可加大在化妆品配方研发、功效验证等方面的投入。对于市场需求相对较小或增长缓慢的产品类型，可保持适度投入，维持产品的基本研发和更新。

Q8. 对于化妆品中常见的风险物质，比如汞、铅、砷、镉，请问你们的检测顺序和流程有哪些？当检测结果接近或超出标准限值时，我们应该采取哪些措施来改进?

法规对于重金属、微生物及其他风险物质的检测顺序无特别要求，重金属按照《化妆品安全技术规范》（2015版）中的理化指标要求和方法进行检测，我司一般默认选择电感耦合等离子体质谱法，此方法可以同时测定汞、铅、砷、镉等多种元素。检测流程包括：标准系列溶液的制备、样品处理、测定（标准曲线绘制）、计算结果、结果分析与报告。

当确定产品检测结果接近或超出标准限值时，可从以下几个方面进行排查与改进：

1.原料控制：严格筛选原料供应商、加强原料质量检验

2.生产工艺优化：改进生产工艺、加强生产过程控制

3.质量管理体系完善：建立完善的质量管理体系、加强人员培训。

4.产品召回与处理：如果检测结果超出标准限值，应立即停止生产、销售和使用相关产品，并及时向监管部门报告。对已上市的产品进行召回和处理，避免对消费者造成危害。同时，对召回的产品进行进一步的检测和分析，找出问题的根源，并采取相应的改进措施。

Q9. 针对不同剂型的化妆品（e.g.水乳、面霜、面膜、精华等），检测前的样品处理方法有何差异？这些差异是否会影响最终检测结果?

对于样品处理，一般检测方法里面都有明确的规定。例如化妆品理化检测项目中，重金属前处理都是需将样品消解，有湿式消解和微波消解两种方法。膏霜型等无易挥发成分样品一般优选湿式消解法，这类样品无需高温高压即可被混合酸消解，且敞口加热不会导致重金属损失。含易挥发成分的样品（如香水、摩丝、沐浴液、染发剂、精华素、刮胡水、面膜等）或者含难消解的油脂类和膏粉类等干性物质的样品（唇

膏、睫毛膏、眉笔、胭脂、唇线笔、粉饼、眼影、爽身粉、痱子粉等）则采用微波消解法，微波的高温高压可快速破坏油脂、蜡质结构，确保消解彻底，密闭环境可避免挥发损失等。比如化妆品中微生物检验方法总则里面有提及到水溶性的液体、油性液体样品、膏、霜、乳剂半固体状样品、固体样品等样品的前处理方法。具体还得查看对应项目的测试方法。

不同剂型化妆品的样品处理差异，是基于其形态和基质特性的 “针对性优化”，目的是确保目标检测物被充分、稳定地提取，同时消除基质干扰。在严格遵循国家标准和规范操作的前提下，这些差异不会影响检测结果的准确性；反之，若处理不当（如省略关键步骤、参数错误），则可能导致结果偏差。

我司作为专业的第三方检测机构，核心职责之一，就是通过标准化的样品前处理流程，结合方法验证和质量控制，确保无论何种剂型，检测结果都能真实反映样品的实际状态，为化妆品安全评估提供可靠数据。

Q10. 请问进行化妆品刺激性或过敏性检测时，是体外实验（e.g.利用细胞模型来模拟真实使用场景）还是动物实验更具优势?

在化妆品刺激性（如皮肤/眼刺激）或过敏性（如皮肤致敏）检测中，体外实验（尤其是基于细胞模型、3D组织模型的方法）正在逐渐取代动物实验成为主流，其优势在伦理、科学性、法规适配性等方面均更为突出。

体外实验（细胞 / 3D 模型等）

①伦理合规性：无动物伤害，符合“减少动物使用、替代动物实验”的全球伦理共识

②与人体相关性：基于人体细胞或3D组织模型（如3D皮肤模型、角膜上皮模型），直接模拟人体皮肤/黏膜生理环境，结果与人体反应的相关性更高（例如：3D皮肤模型的刺激性预测准确率可达80%-90%）

③检测场景适配性：可精准模拟化妆品“真实使用场景”：

- 如模拟皮肤长期接触（通过模型培养时间调整）；
- 区分不同剂型（膏霜、液体、喷雾）的刺激差异（通过暴露方式调整）；
- 甚至可结合人体细胞来源（如敏感肌细胞模型）针对性检测

动物实验

①存在伦理争议：动物需承受刺激/致敏反应（如皮肤红肿、眼损伤），且多数国家已立法限制（如欧盟2013年起全面禁止化妆品动物实验）；

②与人体相关性：动物与人体存在物种差异（如兔眼黏膜结构、豚鼠免疫系统与人类不同），可能出现“动物结果阴性但人体过敏”或“动物结果阳性但人体安全”的偏差（例如：某些物质对兔眼有刺激，但对人眼无刺激）

③检测场景适配性：动物实验为 “极端暴露场景”（如兔眼实验需直接滴入高浓度样品，远超人类日常使用剂量），无法反映真实使用时的低剂量、长期接触风险。

Q11. 请问你们的化妆品检测报告通常包含哪些核心信息？这些信息如何帮助监管部门、企业和消费者做出判断?

化妆品检测报告的核心信息：报告编号、检测机构名称及资质、样品信息（产品名称、规格型号、生产日期、生产企业等）、客户信息（委托方名称、地址）、检测信息（受理日期、检测依据、检测项目及结果、检测结论）。

如何帮助监管部门、企业和消费者做出判断：

1. 监管部门：用于合规监管和风险防控

通过“检测依据”判断检测是否合法（是否按国家强制标准执行）；

通过检测结果筛查不合格产品（如检出禁用成分、重金属超标），作为行政处罚依据（如召回、罚款）；

通过“批次信息”追溯问题产品来源，排查生产环节风险（如同一企业多批次微生物超标，可能是生产环境不洁）。

2. 企业：用于产品研发、质量控制和市场准入

研发阶段：通过“功效性检测结果”优化配方（如某功效成分效果不足，调整添加量）；通过“刺激性检测”排除潜在风险成分（如细胞模型显示刺激，替换温和成分）；

生产阶段：通过“批次检测结果”监控质量稳定性（如不同批次菌落总数差异大，需改进灭菌工艺）；

市场准入：以“合格检测报告”作为注册备案凭证或用于电商平台入驻、线下商超上架。

3. 消费者：用于判断产品安全性和宣称真实性

安全性判断：重点关注“重金属、微生物、禁限用成分”结果；

功效真实性判断：对宣称“美白、抗皱”的产品，查看对应功效检测结果（如无相关检测项目或结果为“未达标”，可能是虚假宣传）；

信任背书：优先选择有CMA资质机构出具的报告。

总结

化妆品检测报告的核心价值在于“用标准化数据传递产品信息”：监管部门通过它实现合规监管，企业通过它把控质量和准入，消费者通过它规避风险、识别真实功效。对于消费者而言，无需看懂复杂检测方法，重点关注“CMA标识（资质）、安全性项目结果（是否合格）、功效宣称对应检测（是否有依据）” 即可做出基本判断。

Q12. 请问对于进口的化妆品的检测，与国产化妆品相比，在检测流程、检测项目、标准适用范围会有不同吗，可以列举最主要的几点吗？如果我们的产品想要出口的话怎么应对各国法规的差异带来的挑战呢，核心注意要点有哪些？

进口产品需按国内的标准法规进行检测、备案/申报，与国产化妆品大体一致；检测方面不同之处主要在于：

①如产品配方专为中国市场设计的进口产品（境内委托境外生产的除外），除了提交针对中国消费者的肤质类型、消费需求等进行配方设计的说明资料；还需要在中国境内选用中国消费者开展消费者测试研究或者人体功效试验资料。

②如普通化妆品的生产企业未取得所在国（地区）政府主管部门出具的生产质量管理体系相关资质认证，需提交该产品的毒理学试验报告

应对出口化妆品法规差异的核心注意要点：

①熟悉目标市场法规：深入了解出口目的国（地区）的化妆品监管规则和标准要求。例如，美国2022年通过《2022年化妆品监管现代化法案》（MoCRA），升级了化妆品安全标准和监管框架，企业需注意及时进行产品列名的年度更新操作等；欧盟对化妆品标签要求明确且严格，出口欧盟的化妆品必须指定欧盟境内的法人或自然人承担合规义务等。

②关注原料管理差异：不同国家对化妆品原料的禁限用规定不同。如部分汞化合物在国内可作为防腐剂，在日本已列入禁用原料；月桂酰肌氨酸钠等4项原料在日本列入防腐剂，在国内未按防腐剂管理。企业需确保所用原料符合目标市场的规定。

③重视标签合规要求：各国对化妆品标签的标注内容和格式要求各异。韩国化妆品包装分为“1 次包装”“2 次包装”，每种包装标签标注事项不同，且对香精过敏原有着具体的标注要求。企业要按照目标市场要求规范标签标注。

④及时完成注册备案：不同国家的注册备案流程和要求不同。向日本出口和销售在日本境外制造的化妆品，需由日本国内的生产经营者通过日本药品医疗器械综合机构（PMDA）代为向厚生劳动省申报相关事项，方可进口并且销售。企业需了解并遵守目标市场的注册备案程序。

Q1. Could you please introduce the current business activities your company is engaged in?

We are dedicated to providing professional services covering the entire product lifecycle for cosmetics companies, including:

1. Cosmetics safety compliance testing services: Based on the "Cosmetics Safety Technical Specifications", we offer a complete set of safety testing services. ① Covering all items of the product for testing (physical, microbiological, toxicology, etc.). ② Focus on detecting prohibited substances, restricted substances (such as heavy metals, hormones, antibiotics, etc.). ③ Accurately testing the content and compliance of permitted preservatives, permitted sunscreen agents, and other restricted ingredients.

2. Cosmetics efficacy evaluation services: We have a professional cosmetics efficacy laboratory. We provide comprehensive efficacy evaluation solutions: ① Human efficacy evaluation tests: Through volunteer tests to evaluate the claimed efficacy of the product (such as anti-aging whitening, sun protection, hair loss prevention, repair, acne removal, nourishment, etc.). ② Consumer usage tests: Collecting sensory evaluations and effect feedback from target consumers in actual usage scenarios. ③ Laboratory tests (in vitro efficacy experiments): Using cells, tissues or instrument models to conduct preliminary screening and mechanism research of efficacy components or formulas.

3. Export cosmetics compliance testing services:

Supporting product exports to global markets, familiar with and conducting tests in accordance with major international regulatory standards; ① International standards: such as ISO series standards. ② Regional pharmacopoeias: including European Pharmacopoeia (EP), US Pharmacopeia (USP), etc. requirements.

4. Cosmetics registration and filing agency services: Providing full-process professional agency services for the registration and filing of domestic and imported cosmetics. Familiar with the regulations of the National Medical Products Administration of China (NMPA), assisting enterprises in efficiently preparing, submitting and communicating the application materials.

Q2. What are the current regulatory policies of the government for the cosmetics industry?

1. Government supervision and safety standards: The cosmetics industry is subject to strict government supervision. Many countries have established strict cosmetic registration systems, requiring products to undergo professional reviews before being launched to ensure the safety and safety of their ingredients. For example, the National Medical Products Administration (NMPA) implements a registration and filing system for cosmetics and updates the list of prohibited raw materials to prohibit the use of cannabis-like raw materials, etc.
2. Regulation of ingredients and efficacy promotion: The promotion of ingredients and efficacy of cosmetics is strictly restricted to prevent exaggeration and misleading consumers. For example, the National Medical Products Administration explicitly prohibits the claim of containing "stem cells" and "food-grade" cosmetics, and conducts clean-up and rectification of related products.
3. Online business operation supervision: To strengthen the supervision of cosmetics online sales, the National Medical Products Administration has issued the "Regulations on the Supervision and Management of Cosmetics Online Business", requiring platform operators to fully, truthfully, accurately, clearly, and timely disclose product information to ensure consistency with the registered or filed materials.
4. Safety assessment and risk monitoring: As of May 1, 2025, the complete version of the safety assessment system for cosmetics registration and filing has been fully implemented, strengthening the risk prevention system, and promoting the regulatory approach from "post-event handling" to "pre-event prevention".
5. Raw material innovation and support policies: The "Several Provisions on Supporting the Innovation of Cosmetics Raw Materials" issued by the National Medical Products Administration provide policy guarantees for raw material innovation, encouraging enterprises to increase R&D investment.

Q3. What should be paid most attention to in cosmetics registration? What quality tests should cosmetics products undergo when entering the market?

I. The following points should be noted most in cosmetics registration:
1. Product quality safety: Ensure that the products comply with relevant national standards and do not contain prohibited substances or excessive limit substances.
2. Ingredient compliance: Cosmetics ingredients must comply with regulatory requirements.
3. Packaging labels and publicity authenticity: The label information must be clear and standardized; the publicity content should be true and accurate, consistent with the actual ingredients and effects of the product. There should be no false publicity or misleading content.
4. Scientific basis: Provide toxicological test reports, efficacy component research reports, etc. as scientific basis to prove the safety and effectiveness of the product.
5. Safety assessment: According to the "Technical Guidelines for Cosmetics Safety Assessment (2021 Edition)", conduct safety assessment of raw materials and products to ensure that they do not cause harm to human health under normal and reasonable usage conditions.
6. Data preparation and process compliance: Ensure the completeness of data, the standardization of the process, and the authenticity, accuracy, and completeness of the data. Cooperate with regulatory authorities for verification and provide rectification materials or accept on-site inspections.
These precautions help ensure the compliance and safety of cosmetics registration and avoid legal risks and market issues.
II. Cosmetics products entering the market need to undergo a series of strict quality tests, which run through the entire process from research and development, production, pre-market approval, and post-market sales.
1. Factory inspection (self-inspection/typical inspection)
Nature: Conducted by the manufacturing enterprise itself or by a qualified laboratory. It is a quality control that must be carried out for each batch of products before leaving the factory. The basis for inspection is the product implementation standard.
2. Pre-market inspection (registration/verification inspection)

Nature: Conducted by the cosmetics registrant or registrant to be registered, commissioned by the national drug supervision and administration bureau's recognized cosmetics registration and registration inspection institutions. The basis for inspection is the "Cosmetics Registration and Registration Inspection Work Specifications (2019 No. 72)".

3. Safety assessment report

Although not exactly equivalent to "inspection", it is an extremely crucial and mandatory part before market entry.

4. Post-market sampling and market supervision

After the product is launched, the national drug supervision and administration bureau and the various levels of drug supervision and administration departments will continuously conduct market supervision and inspection and sampling tests.

Therefore, from production to market launch, cosmetics need to undergo three core quality safety control links: factory inspection (batch control) + pre-market inspection (compliance entry) + safety assessment (comprehensive judgment), and accept continuous market supervision sampling in post-market sales. Each link is crucial and cannot be missing. Enterprises must strictly abide by the latest national regulations in actual operation.

Q4. How can we ensure the safety of product quality during the production process?

1. Strictly abide by laws, regulations and industry standards
2. Strengthen raw material procurement and supplier management
3. Standardize production process procedures
4. Enhance management of production environment and equipment
5. Implement a comprehensive quality inspection system
6. Establish traceability and recall procedures
7. Enhance employee training and quality culture construction
8. Continuously improve and conduct risk assessment

By taking these measures, cosmetic manufacturers can maximize the guarantee of product quality safety during the production process, ensuring that the cosmetics used by consumers are safe and reliable.

Q5. We use E. coli to produce astaxanthin and incorporate it as a raw material into cosmetics. Could you please tell me what the minimum content of astaxanthin in astaxanthin cosmetics should be to meet the standards?

According to the updated "Raw Material Usage Information for Listed Products" by the China Inspection and Quarantine Institute on February 9, 2025, the usage amount of astaxanthin in systemic retention products and ocular retention products is 3%. According to the reference usage principles in the "Raw Material Usage Information", for the same raw material with the same application method, the order of application areas can be in sequence as the whole body, trunk, face (including neck), hands and feet, head, hair, lips, eyes, and fingernails. The usage amount of the raw material in the subsequent application areas can be referred to the usage amount in the previous application areas. Cleansing products can refer to the usage of retention products.

If the usage amount of astaxanthin added to the product exceeds 3%, then it is necessary to search in the "Cosmetic Raw Material Data Usage Guide" to see if there are other types of evidence available for safety assessment; if there are no available evidence types, then the following methods need to be followed to ensure that the toxicological data of the raw material is complete and to prove the safety of the raw material:

1. Risk assessment procedure (4-step method) of "Cosmetic Safety Assessment Technical Guidelines (2021 Edition)"
2. "Application Technology Guide for Toxicological Concern Threshold Values (TTC)"
3. "Application Technology Guide for Cross-Reference (Read-across)"

Q6. We want to add astaxanthin produced by us to cosmetics (such as masks, creams, essential oils, etc.). Now, what methods are available in the market to ensure that the products do not deteriorate over a long period of time? (If preservatives are mentioned: Then, could you please tell us what the appropriate dosage of preservatives should be to ensure a qualified product?)

Astaxanthin itself has poor stability and is prone to inactivation and discoloration due to factors such as light, heat, oxygen, and pH. Therefore, it is necessary to minimize the influence of these factors during production and storage. Considerations can be made from raw materials, formulations, and processes:

1. Select appropriate carriers such as liposomes, emulsions, micro/nanoparticles, or adopt encapsulation and complexation techniques to encapsulate astaxanthin and protect it from external environmental influences.

2. Add antioxidants

Quercetin: Quercetin is a derivative of the plant flavonoid rutin and has antioxidant and photoprotective effects. It can effectively reduce the degree of astaxanthin discoloration. (According to the "Information on Raw Material Usage of Listed Products", the usage amount of quercetin in systemic residence products is 2%, and in ocular residence products is 3%)

3. Control the formulation system

(1) Avoid coexistence with reducing agents: Astaxanthin is easily reduced by reducing agents under acidic conditions. Therefore, reducing agents such as vitamin C should be avoided in the formulation.

(2) Control pH value: Astaxanthin has better stability in acidic conditions. The pH range in cosmetics is generally 5.5-6.2. It is not recommended to use strong acids (such as acids, salicylic acid) or strong bases (such as soap base) simultaneously, as strong acids and strong bases will damage the structure of astaxanthin and affect its efficacy.

(3) Avoid coexistence with metal ions: Astaxanthin is prone to form complexes with metal ions under acidic conditions. Therefore, it is necessary to avoid coexistence with metal ions such as copper peptides in the formulation.

4. Control the production environment: During the production process, strictly control temperature, humidity, and light conditions. The temperature should be controlled below 25°C, and the humidity should be between 40%-60%. Avoid production operations under strong light.

5. Use light-proof and sealed packaging: Astaxanthin is sensitive to light and prone to photodegradation. Use packaging materials with good light-blocking properties, such as dark glass bottles, aluminum foil bags, etc., to effectively block ultraviolet and visible light, reduce the photoxidation of astaxanthin, and extend the product's shelf life. Ensure good sealing of the packaging to prevent air, moisture, and microorganisms from entering. Vacuum packaging, nitrogen-filled packaging, etc. can be used to reduce the contact between the product and air, inhibiting oxidation reactions and microbial growth.

Q7. The astaxanthin we are currently researching is involved in cosmetics, food health care, medicine, feed, etc. Could you please explain how to balance the innovation investment for different product types and meet market demands during the product development process?

1. Comprehensive understanding of the market situation: Conduct in-depth research on various markets such as cosmetics, food health care, medicine, and feed, to understand the scale, growth trend, competitive landscape, and consumer preferences of each market. For example, the demand for astaxanthin in the cosmetics market may focus more on its antioxidant, anti-aging, and sun protection effects, while the feed market may pay more attention to its effects on animal growth, reproduction, and immunity enhancement.

2. Precise positioning of target customers: Clearly define the target customer groups for different product types. For example, the astaxanthin products for cosmetics mainly target middle-to-high-end consumers who are concerned about skin care; food health care products may target middle-aged and elderly people who are health-

conscious and pursue high-quality life; medicines mainly target patients with specific diseases or health issues; feed products target farmers in the fields of aquaculture and poultry farming.
3. Allocate resources based on market demands: If a certain product type has a large market demand and high growth potential, appropriate innovation investment can be increased. For example, in the cosmetics market, if consumers have a strong demand for the anti-aging effect of astaxanthin, more investment can be made in cosmetic formula research and efficacy verification. For product types with relatively smaller market demand or slow growth, moderate investment can be maintained to maintain the basic research and update of the products.

Q8. Regarding the common risk substances in cosmetics, such as mercury, lead, arsenic, and cadmium, could you please tell us about your testing sequence and process? When the test results are close to or exceed the standard limits, what measures should we take to improve the situation?

There are no specific requirements in regulations for the testing sequence of heavy metals, microorganisms, and other risk substances. For heavy metals, they are tested according to the physicochemical indicators and methods in the "Cosmetics Safety Technical Specifications" (2015 edition). Our company generally defaults to the inductively coupled plasma mass spectrometry method, which can simultaneously determine various elements such as mercury, lead, arsenic, and cadmium. The testing process includes: preparation of standard series solutions, sample processing, measurement (standard curve drawing), result calculation, result analysis and reporting.
When it is determined that the product test results are close to or exceed the standard limits, the following aspects can be investigated and improved:
1. Raw material control: strictly select raw material suppliers and strengthen raw material quality inspection
2. Process optimization: improve the production process and strengthen production process control
3. Quality management system improvement: establish a complete quality management system and strengthen personnel training.
4. Product recall and handling: if the test results exceed the standard limits, immediately stop production, sales, and use of related products, and promptly report to the regulatory authorities. Recall and handle the already launched products to avoid harm to consumers. At the same time, conduct further testing and analysis on the recalled products to identify the root cause of the problem and take corresponding improvement measures.

Q9. What are the differences in sample processing methods before testing for different formulations of cosmetics (e.g. lotion, cream, mask, essence, etc.)? Do these differences affect the final test results?

For sample processing, there are generally clear regulations in the general testing methods. For example, in the physicochemical testing items of cosmetics, the pre-treatment of heavy metals requires sample digestion, with two methods: wet digestion and microwave digestion. For samples without volatile components such as cream-type, the wet digestion method is generally preferred. These samples can be mixed acid digested without high temperature and high pressure, and open heating will not cause loss of heavy metals. Samples containing volatile components (such as perfume, mousse, bath liquid, hair dye, essence, shaving water, mask, etc.) or dry substances such as lip balm, mascara, eyebrow pencil, rouge, lip liner, powder, eye shadow, talcum powder, and antiperspirant powder) are processed by microwave digestion. The high temperature and high pressure of microwave can quickly destroy the lipid and waxy structure to ensure thorough digestion, and a closed environment can avoid volatilization loss. For example, in the general principles of microbiological testing methods for cosmetics, there are mentions of the pre-treatment methods for water-soluble liquid, oily liquid samples, pastes, creams, emulsions semi-solid samples, and solid samples. Specific methods need to be checked for the corresponding test items.
The differences in sample processing for different formulations of cosmetics are "targeted optimization" based on their morphology and matrix characteristics. The purpose is to ensure that the target analytes are fully and stably extracted while eliminating matrix interference. Under the premise of strictly following national standards and

standard operating procedures, these differences will not affect the accuracy of the test results; conversely, if the processing is improper (such as omitting key steps, parameter errors), it may lead to deviation in the results.
As a professional third-party testing institution, one of our core responsibilities is to ensure that regardless of the formulation, the test results can truly reflect the actual state of the samples through standardized sample pre-treatment processes, combined with method validation and quality control, to provide reliable data for cosmetic safety assessment.

Q10. When conducting tests for cosmetic irritancy or allergenicity, is in vitro experimentation (e.g. using cell models to simulate real usage scenarios) or animal experimentation more advantageous?

In cosmetic irritancy (such as skin/eye irritation) or allergenicity (such as skin sensitization) tests, in vitro experimentation (especially methods based on cell models and 3D tissue models) is gradually replacing animal experimentation as the mainstream, with advantages in ethics, scientificity, and regulatory compatibility being more prominent.
In vitro experimentation (cell / 3D models, etc.)

① Ethical compliance: No animal harm, in line with the global ethical consensus of "reducing animal use, replacing animal experiments"

② Relevance to the human body: Based on human cells or 3D tissue models (such as 3D skin models, corneal epithelium models), directly simulating the physiological environment of human skin/mucous membranes, the results have a higher correlation with human responses (for example: the accuracy rate of irritancy prediction for 3D skin models can reach 80%-90%)

③ Detection scenario adaptability: Can precisely simulate the "real usage scenarios" of cosmetics:

- Such as simulating long-term skin contact (by adjusting the model culture time)
- Distinguishing the irritancy differences of different formulations (such as creams, liquids, sprays) (by adjusting the exposure method)
- Even combining with human cell sources (such as sensitive skin cell models) for targeted detection

Animal experimentation

① Ethical controversy: Animals need to endure irritation/sensitization reactions (such as skin redness, eye damage), and most countries have legislated restrictions (such as the complete ban on cosmetic animal experiments in the EU since 2013)

② Relevance to the human body: There are species differences between animals and humans (such as rabbit eye mucosa structure, guinea pig immune system are different from humans), resulting in deviations such as "negative animal results but positive human allergy" or "positive animal results but safe for humans"

③ Detection scenario adaptability: Animal experiments are "extreme exposure scenarios" (such as rabbit eye experiments require directly dripping high-concentration samples, far exceeding the daily usage dose of humans), unable to reflect the low-dose, long-term exposure risks during actual use.

Q11. What core information does your cosmetic testing report usually contain? How does this information help regulatory authorities, enterprises, and consumers make judgments?

Core information of the cosmetic testing report: Report number, name and qualification of the testing institution, sample information (product name, specification model, production date, manufacturer, etc.), customer information (name and address of the client), testing information (acceptance date, testing basis, testing items and results, testing conclusion).
How does it help regulatory authorities, enterprises, and consumers make judgments:

1. Regulatory authorities: For compliance supervision and risk prevention
By "testing basis" to determine if the testing is legal (whether it follows national mandatory standards);
By "testing results" to screen out non-compliant products (such as the detection of prohibited ingredients, excessive heavy metals), as the basis for administrative penalties (such as recall, fines);
By "batch information" to trace the source of problem products and investigate production process risks (if the same enterprise has multiple batches with excessive microorganisms, it may be due to unclean production environment).
2. Enterprises: For product research and development, quality control and market access
Research and development stage: By "efficacy testing results" to optimize the formula (if the effect of a certain efficacy component is insufficient, adjust the addition amount); By "irritation testing" to eliminate potential risk components (if cell models show irritation, replace with mild components);
Production stage: By "batch testing results" to monitor the stability of quality (if there are significant differences in colony counts of different batches, the sterilization process needs to be improved);
Market access: As a registration and filing certificate or for entry into e-commerce platforms and online supermarkets.
3. Consumers: For judging product safety and authenticity of claims
Safety judgment: Focus on the results of "heavy metals, microorganisms, prohibited and restricted components";
Efficacy authenticity judgment: For products claiming "whitening, anti-wrinkle", check the corresponding efficacy testing results (if there are no related testing items or the result is "not up to standard", it may be false advertising);
Trust endorsement: Preferentially choose reports issued by institutions with CMA qualifications. Summary
The core value of cosmetic testing reports lies in "transmitting product information through standardized data": Regulatory authorities use them for compliant supervision, enterprises use them to control quality and access, and consumers use them to avoid risks and identify the actual efficacy. For consumers, they don't need to understand the complex testing methods. They only need to focus on "the CMA mark (qualification), safety item results (whether qualified), and efficacy claims corresponding tests (whether there is a basis)" to make a basic judgment.

Q12. May I ask if there are any differences in the testing process, testing items, and applicable standards when testing imported cosmetics compared to domestic cosmetics? Could you list the main points? Also, if our products are to be exported, how can we address the challenges brought by the differences in regulations among various countries? What are the core points to pay attention to?

Imported products need to undergo testing, filing/registration in accordance with domestic standards and regulations, which is generally similar to domestic cosmetics. The main differences in testing lie in:

① For imported products whose formulas are specifically designed for the Chinese market (excluding those produced by overseas parties under domestic commission), in addition to submitting the description of the formula design based on the skin type and consumption demands of Chinese consumers, it is also necessary to obtain consumer test research or human efficacy test data conducted within China.

② For ordinary cosmetic manufacturers that have not obtained the relevant qualification certifications for production quality management from the competent authorities of the host country (region), they need to submit the toxicology test report of the product.

The core points to pay attention to when responding to the differences in cosmetics regulations for export:

① Familiarize with the regulations of the target market: Deeply understand the cosmetic regulatory rules and standard requirements of the export destination countries (regions). For example, the United States passed the "2022 Cosmetics Regulatory Modernization Act" (MoCRA) in 2022, upgrading the cosmetics safety standards and regulatory framework. Enterprises need to pay attention to timely conducting annual updates for product listing

operations, etc.; the EU has clear and strict requirements for cosmetics labels, and cosmetics exported to the EU must designate a legal person or natural person within the EU to undertake compliance obligations, etc.

② Pay attention to differences in raw material management: Different countries have different restrictions on the use of cosmetics raw materials. For example, some mercury compounds can be used as preservatives in China, but have been listed as prohibited raw materials in Japan; lauryl glucoside sodium and four other raw materials are listed as preservatives in Japan but not managed as preservatives in China. Enterprises need to ensure that the used raw materials comply with the regulations of the target market.

③ Attach importance to label compliance requirements: The labeling requirements and formats for cosmetics vary among different countries. Korean cosmetic packaging is divided into "1-time packaging" and "2-time packaging", and the labeling contents and matters of each packaging are different, and there are specific labeling requirements for allergens of fragrance. Enterprises need to standardize the labeling according to the requirements of the target market.

④ Complete registration and filing in a timely manner: The registration and filing procedures and requirements vary in different countries. For exporting and selling cosmetics manufactured abroad to Japan, it is necessary for Japanese domestic producers to file relevant matters with the Ministry of Health, Labour and Welfare through the Japan Pharmaceutical Medical Devices Comprehensive Agency (PMDA) on behalf of the Japanese domestic producers. Only after completing the filing can the products be imported and sold. Enterprises need to understand and abide by the registration and filing procedures of the target market.