CATALYSIS RESEARCH

Research Article

The Catalysis of Temperature and Drug Packing Systems on the Chemical Additives of Drug

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Received: October 9, 2023
Published: November 24, 2023

ABSTRACT

Drug-Chemical additives play an important role in preserving medicines for a longer period and the validity of the largest period, as well as methods of storing medicines and the effect of temperatures on chemical medicines. If you look at some of your food products, you will find on them some symbols for different chemical compounds that many people don't know about and don't care about. In a more meaningful sense, I was little to no food product without additives, from additives for flavor, color and aroma, to "preservatives" that give it a longer shelf life. Preservatives are commonly used in medications such as acetaminophen, insulin, and cough syrups to help prevent bacterial contamination. Simply put, preservatives help prevent the growth of microorganisms, especially bacteria and fungi, that may cause disease or infection. The word preservatives refers to a large group of chemical, natural, or synthetic compounds that prevent the growth of bacteria in many products such as foods, medicines, and personal care items. In order to remain usable as long as possible.

Keywords: drug storage, additives, Chemical drugs

INTRODUCTION

Temperature and drug storage methods have a significant impact on the chemical additives of the drug Of course, there are natural alternatives to chemical preservatives, but they do not have the same shelf life for foodstuffs, but it is enough that they do not cause any health problems. From Natural preservatives: Vitamin B12, which is found in egg yolks and fish., Vitamin C, which stands for E300-304, is added to soft

drinks and sugary items., Tocopherol: one of the types of vitamin E and has the symbol E306-309, which is found in sunflower and corn seeds., E338 phosphoric acid., Bee honey because it contains many antioxidants., Lecithin: which is extracted from animal and plant tissues, and consists of phosphoric acid and choline (one of the B vitamins), acts as a food stabilizer and is used in desserts such as ice cream., Some substances extracted from the rosemary plant as antioxidants. It is also possible to preserve food by some traditional natural methods such as salting, smoking, drying, pickling, or preserving sugar. All of these methods either aim to destroy microorganisms in food or make food unsuitable for the growth of microorganisms, but these materials must be used in certain concentrations. And under a suitable temperature to preserve food for long periods. Poor storage of medicines in homes is the most prevalent in the Arab region, noting that a Gulf study conducted at the University of Sharjah and included 300 families showed that 42% of medicines stored in homes are kept in bathrooms, 3% of them are kept in kitchens, 39% in bedrooms, and 16 % in sitting rooms, and that a large percentage of these medicines are often expired, and the study indicated that these medicines are exposed to heat and humidity factors, which affects their validity.

The Effect of Temperature on Chemical Additives for Drugs

Refrigeration: Chilling cooked foods at a temperature of less than 3°C (37°F)

Freezing: Food is stored at a very low temperature of minus 18 degrees Celsius or below, and this helps the food not to spoil except for some enzyme activity in uncooked vegetables and most fruits.

Drying: Drying foods in the sun and wind is the most effective and simplest way to preserve food.

Pasteurization: This is a heat treatment that kills all microorganisms in milk. Warm and hold the milk at 72°C for 15 seconds and then quickly cool down to 10°C

Pickling: It is a preservation technique that can be applied to vegetables, meat, fish, eggs and fruits. Using acetic acid with an acidity of 4 to 6%.

Salting: Salt is one of the most important alternatives to preservatives, and the most common one is the use of iodized salt to preserve fish.

Preservation using sugar: Sugar is a food preservative used in jams and jellies, as the high concentration of it kills the present bacteria.

Classification of Chemicals Additive of Drugs

They are of different types, including:

Anti-Bacterial Ingredients: Helps slow or prevent the growth of bacteria, molds and fungi.

Antioxidants: They prevent the effect resulting from the oxidation of oils and fats with oxygen found in nature, thus preserving the color, taste, smell and many vitamins and amino acids that can be destroyed by exposure to air.

Chemical preservatives: A common chemical preservative used in medicines

Types of chemicals additives of Drugs

Preservatives can be made from "natural" chemicals such as salt or alcohol. They can also be man-made or synthetic chemicals. "Natural" or "organic" chemicals are not necessarily healthier than synthetic or man-made chemicals. In fact, artificial preservatives such as sodium nitrate, sodium benzoate and propionate have long been used in food preparation because they are effective in small amounts. Today, food and color additives, including preservatives, are studied, regulated and monitored more rigorously than at any other time in history, and the Food and Drug Administration has the primary legal responsibility for determining their safe use. To add a new food preservative to market, or before using a substance that has already been approved for one use in another application, the manufacturer or other sponsor must obtain approval from the U.S. Food and Drug Administration (FDA) and provide scientific data showing that the substance is safe and fit for its intended use. .

Preservatives are added to foods to help prevent or slow down spoilage from bacteria, mold, fungi, or yeast, as well as to slow or prevent changes in food colour, flavor, or texture, delay rancidity, and maintain freshness.

Chemicals Additives in Vaccines

Preservatives kill, prevent, or slow the growth of microorganisms, especially bacteria and fungi that may cause disease or infection. Studies have found that there is no convincing scientific evidence that low-dose thimerosal as a preservative in vaccines causes harm, except for potentially minor reactions such as redness and swelling at the injection

site. The U.S. Food and Drug Administration provide information about the safety of thimerosal.

Drugs storage conditions:

Safe drug storage helps protect patients and family members from harm. Medicines that are not properly stored may cause accidental poisoning. Each year, about 60,000 children are taken to the emergency room because adults are taking medication in the absence of a drug. Medicines may not work properly or become harmful if not stored properly. Tips for storing medication safely include:

Follow the storage instructions on the medicine packages. Some medicines need to be refrigerated or kept away from light. Check the label for storage instructions. If you are not sure, ask your pharmacist how to store the medicine.

1. Store unrefrigerated medications in a cool, dry place. The medicine should not be stored in the bathroom. Moisture and heat from showers, bathtubs, and sinks can damage medicines. Medicines may not work properly or may become dangerous. Safe places to store medicine include a kitchen cabinet away from the sink or stove, or on a shelf in a cupboard.

2. Chemical drugs should be stored away from food in the refrigerator. Keep the medication in the refrigerator drawer or put the medication in a container to protect nearby foods. Keep refrigerated medicines at a constant temperature. Do not put the medicine in or near the freezer compartment of the refrigerator. Do not store medicines in the refrigerator door as the temperature may change when the door is opened.

3. Do not keep medicines in the car. The car may become very hot. Heat may cause medicines not to work or become dangerous.

4. Store medicines in their original containers with labels. Never mix different types of medicine in the same bottle. If you are using a pill box or other medication organizer, keep the original medication containers with labels. The original label may provide assistance if you have questions about the drug's name, dosage, refill, or instructions for how to take or store the drug.

5. Keep medicines high and out of the reach and sight of children. Always put medicines away after each use. Do not leave the medicine on a table, purse, or diaper bag, even if it needs to be given to the patient again in a few hours. This is especially important if it is a dangerous drug or a controlled substance (of an anesthetic nature).

The effect of High Temperatures on Chemical Drugs:

The German Federal Ministry of Health confirmed that storing medicines properly ensures that they maintain their validity and efficacy, and also protects the person from taking expired or spoiled medicines. She stressed the need to pay attention to several things when storing medicines, including the need to always keep them in their original package. As for the storage temperature, medicines usually fall into one of three groups: The first group is medicines that are stored at normal room temperature and range between 15 and 30 degrees Celsius. The second group is stored in the refrigerator, which ranges between 2 and 8 degrees Celsius. The third is kept at a freezer temperature of -18 or less., The ministry added that exceeding or decreasing the authorized temperature for a short period and in a limited manner does not constitute a problem for medicines that must be stored at the same room temperature. But this does not apply to the rest of the types of medicines, as it is never permissible to freeze medicines that must be kept at the temperature of the refrigerator, stressing the need to dispose of them immediately if they are exposed to freezing, as they become unfit for use.

It is also necessary that medicines not be exposed to excessive heat or direct sunlight, and it is forbidden to store them in the bathroom, due to the high fluctuation in the level of humidity in it, and the high temperatures in it, and therefore it is not a suitable place for storing medicines. You should pay attention to the expiration date of the drug and stick to it ., You should pay attention to the expiration date of the drug and stick to it .,As for the car, medicines should not be left in it, due to the possibility of exposure to high temperatures, especially in the summer., As for medicines that can spoil or become contaminated after opening their package for the first time, such as eye drops for example and liquid medicine, they must be used within the time period specified in the attached medicine leaflet, such as a week. In order for the patient not to forget that appointment, he can write down the date of opening the box and the date of expiry of its use after opening on the box itself. The Ministry stressed the need to pay attention to following hygiene conditions when receiving any medicines, for example, when taking liquid medicines, care should be taken so that the remaining amount in the package is not exposed to contamination by hands or other things in the vicinity of the place during the taking of the dose. This

requires the patient to close the package well immediately after taking the dose. There are many risks to those who take invalid medicines due to poor storage, the expiry date written on the medicine box suggests its safety. However, due to neglect of the drug and its poor storage in stores or pharmacies, it leads to a change in the composition of the chemical substance and its composition is broken, which leads to the ineffectiveness of the drug. The patient who is compelled to buy the drug checks the expiry date, while not realizing that there is a greater danger than the expiry date, which is poor storage, which has no evidence or signs of spoilage as a result of poor storage, which leads to serious risks that the patient may not be aware of. Al-Siyasiyyah had a stance on the issue of "bad storage of medicines", who is responsible for them, and for the conditions for storing them, and are they subject to the required specifications and conditions, and is there follow-up by those concerned in health on this? In the Ministry of Health:

Drug stores licensing terms

First, we confronted the Licensing Department at the Ministry of Health, and we met the head of the licensing department, and we asked him about the conditions that must be met in the pharmacy and stores for storing medicines. He said: The store or the pharmacy must meet certain conditions that they must abide by, namely: that between the pharmacy and the other is 150 meters or 50 meters or to be destitute in front of hospitals. The area of the pharmacy should be 30 square meters, and it should be painted with white paint. The place should be open to air, and it should have a clear sign with its name on it. If it is located in a hot area, it must have an air conditioner and a refrigerator. That a certain temperature be not less than 8 degrees and not more than 25 degrees, and this degree is for regular medicine, and some medicines need a low temperature to be placed in refrigerators. The supervisor of the pharmacy should be a doctor of pharmacy or a pharmacist assistant, because of his knowledge of the medicines and the appropriate conditions for each medicine. Department of Control of Pharmacies in the Ministry of Health We entered another department, which is the Department of Control of Pharmacies in the Ministry of Health, and we asked them the following questions: Do you follow up and inspect pharmacies to ensure that the places where medicines are stored and are valid? Is this going down permanently and randomly? We had a meeting with one of the employees in the Pharmaceutical Control Department, who refused to give his name for reasons he did not explain. He said: The Pharmaceutical Control Department of the General Department of Pharmacy and Medical Supplies conducts surprise campaigns for these pharmacies to ensure the safety of medicines and the conformity of their stores with the conditions set by the Ministry of Health. He added: This year and last year, we visited a group of pharmacies and seized many unlicensed and violating pharmaceutical facilities, in which corrupt drugs were found. Due to poor storage and smuggling of medicines, these medicines have been confiscated and legal action is taken against these pharmacies. Poor storage is represented by not providing the appropriate temperature for storing different types of medicines, as some of them need a very low temperature, as well as the humidity in the store that leads to the spoilage of medicines.

High Authority for Drugs

We knocked on another door related to medicines, and we had a pause at the door of the General Authority for Medicines, so we met Dr. Adel Abdel Rahman Hamid, Director of Drug Control in the Authority, who initially gave us an explanation of the Authority's work, roles and specialization. The authority, represented by the Control Department, assigns committees to field visits to verify the storage of medicines under the necessary conditions. The researcher added: "As you know that there are medicines that need different preservation conditions, some of them need room temperature, less than 30 °C, or less than 25 °C. For this, what needs a refrigerated room, i.e. less than 15 °C, and some of them need a refrigerator, i.e. from 2 – 8 degrees Celsius, and one of the main tasks of the authority is: verifying the manufacture of these medicines within the conditions of good manufacturing, as well as they must be preserved, and stored within the conditions of storage. Importers are obligated to transport and import medicines in refrigerated containers, and there is a good commitment from importers to that. He explained that with regard to the continuous descent to drug importers, there is a committee that was assigned during the first half of this year to monitor the main warehouses of importers, as well as the branches in: Amanat Al Asimah to verify compliance with the necessary storage conditions to ensure the safety of drug delivery to pharmacies in conformity with specifications, effective and safe . We also reviewed the last field visit report in May 2010, which clarifies the number of warehouses that violate the conditions, and how many have been closed, with the following results: importers who are committed to good storage conditions, and the number of 21 establishments, importers and facilities, who are partially and fully committed to storage conditions, have simple notes Number 23 facilities, has been awarded.

Correct ways to store

At the beginning, Dr. Tamer Ibrahim, who works as a pharmacist, mentioned that there is a very large group of people who are ignorant of the correct methods for storing medicines, and this sometimes causes the medicine to be ineffective on the patient's body. As the temperatures of some medicines differ from others, and one of the biggest mistakes that people make in the world of medicines is to keep medicines together in one place such as the pharmacy that is at home, and therefore medicines must be separated from each other according to their temperature, as for placing medicines In the drawers, there is no objection to that, provided that they are at the same room temperature. Ibrahim warned against keeping medicines inside the car, as they interact with the temperature of the car.

Ibrahim stressed that there are medicines that have a shorter validity period once opened, such as eye drops, which are valid for 14 days from the date of opening, and their use may then lead to inflammation of the eye or bacterial infection, as well as antibiotics taken by drinking, whose validity ranges from Only a week to 15 days from the date of opening the package, as well as antibiotics, their validity period is very short., Ibrahim continues that one of the medicines that are considered one of the most susceptible to spoilage as a result of poor storage, is the anesthetic drugs used by surgeons, which must be kept at certain temperatures and low humidity., Ibrahim hinted that one of the biggest mistakes in getting rid of the drug is to get rid of it by placing it in the garbage, which causes radiation and chemical reactions that are produced with the rest of the waste that will surely affect human health and the environment in general in the future, and therefore the correct way to get rid of the drug is It was handed over to pharmacies, and recently pharmacies started receiving any excess percentage of medicines from patients, in order to protect them from the effects of poor drug storage.

Follow the Following Guidelines for Storing Medication

1- The medicine should be stored and protected from light and kept inside the outer package and out of the hands of children.

2- Intramuscular injections such as (insulin) must be kept in the refrigerator, as for tablets and capsules, they must be kept in a dry and cool place.

3- For ear and eye drops, they must be kept in the refrigerator, and to be disposed of after 15 days of opening the package. As for ointments and creams, they must be kept in a dry and cool place.

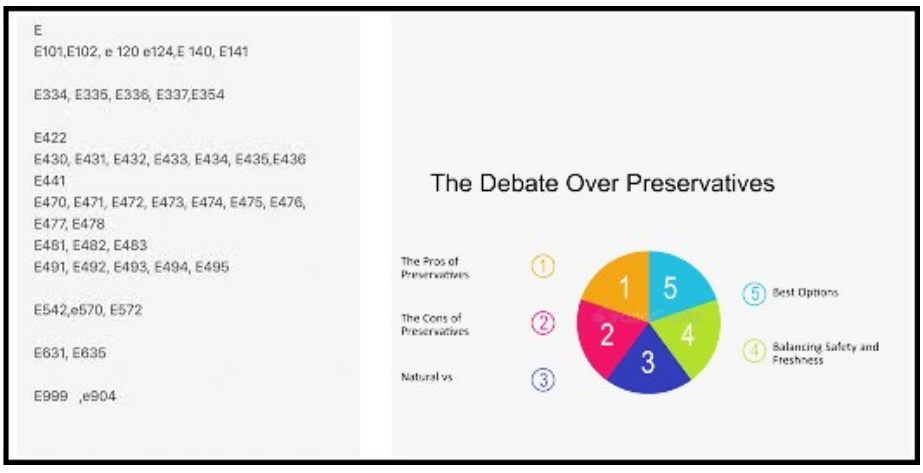
4- Products sensitive to freezing or low temperatures should be stored in the upper shelves of the refrigerator.

5- It is forbidden to store medicines in the bathroom, due to the extreme fluctuation in the level of humidity in it and the high temperatures in it. As for vital hormones, they should be stored safely at a temperature below 25°C or in a cool atmosphere.

6- As for the drug "Amoxil", the syrup that is used to combat intestinal bacterial infections, it is prohibited to put it outside the refrigerator and be used for 15 days only, after which it must be disposed of.

7- Finally, medicines should not be placed in one of the closed drawers, unless the room temperature is of the same temperature as the medicine, Figures (1-6).

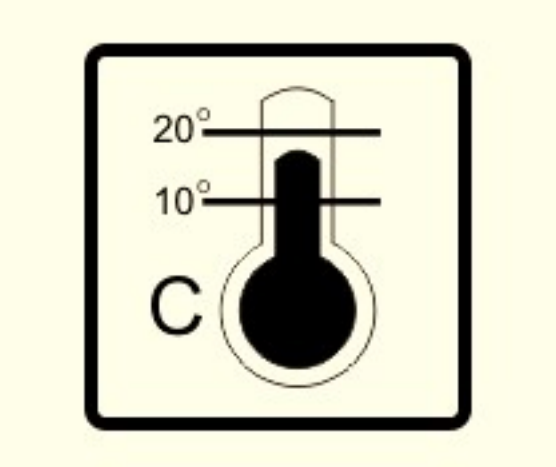
Figure 1: Additives for Pharmaceutical Drugs.



Citation: Ali WH, et al. (2023). The Catalysis of Temperature and Drug Packing Systems on the Chemical Additives of Drug. Catalysis Research. 3(3):14.

DOI: https://doi.org/10.35702/catalres.10014

Figure 2: Effect of Temperatures on Drugs.



Prescription drug misuse is the use of a prescription drug other than the prescribing doctor's instructions. Prescription drug abuse, also called prescription drug addiction, includes everything from taking a friend's prescription painkiller to relieve your own backache, to sniffing crushed pills or injecting them for a high. Prescription drug misuse can become a persistent and compulsive disorder, despite its negative consequences. A growing problem is the potential for misuse of prescription drugs to affect all age groups, including adolescents. The drugs most commonly abused include opioid analgesics, anxiolytics, sedatives and stimulants. Early identification of prescription drug misuse and early intervention can prevent the problem from turning into an addiction.

Figure 3: Additives Storage of Drug.

Figure 4: Storage of Drugs in Home.

Figure 5: Drugs Storage Refrigerator.

The quality of the drug affects the effectiveness and safety of treatment. Quality depends on proper processing and storage: Medicines of high quality are available when obtained according to rational procedures from reliable suppliers, and when transported and stored in conditions that comply with good preservation conditions. Temperature, air, humidity, and light affect drug preservation. Drug stability conditions vary depending on the drug substance, which is unstable in some way, and depending on the pharmaceutical form of the drug (tablets, solution, etc.) or according to the manufacturing method. Therefore, the drug preservation standards described in the pages of this guide or those written on the notices / labels must be respected by the manufacturer in the event of non-compliance with the recommendations.

Preservation Conditions

Temperature, air, humidity, and light affect drug preservation. Drug stability conditions vary depending on the drug substance, which is unstable in some way, and depending on the pharmaceutical form of the drug (tablets, solution, etc.) or according to the manufacturing method. Therefore, the drug preservation standards described in the pages of this guide or those written on the notices / labels must be respected by the manufacturer in the event of non-compliance with the recommendations. The temperature in the store should not exceed 25°C.

Figure 6: Insulin Storage Refrigerator.

Quality standards

Each drug is characterized by specific standards found in the pharmacopoeia or documents provided by the manufacturers and recognized by the competent authorities in each country. These standards are concerned with external appearance (colour, smell, etc.), physico-chemical properties, methods of analysis, and conditions and duration of preservation. The Certificate of Analysis, provided by the manufacturers for each material, ensures that a particular batch material (material produced in the same production cycle) meets the official quality standards in the manufacturer's country.

However, during transportation, the temperature can reach 50-60°C inside vehicles, containers, or docks, in which case the expiration date cannot be guaranteed. Freezing can be harmful, especially for solutions, as it leads to deterioration or precipitation of the active substances and breakage of the ampoules and packages.

Vaccines, immune globulins, and serums are temperature and light sensitive. Despite modern techniques for producing vaccines that are less sensitive to heat (called 'endothermic'), they must always be kept refrigerated at 2-8°C and the cold chain strictly respected during transport.

Vaccine packages may contain a vaccine vial monitor (VVM), whose color changes to the temperature-sensitive square in its center with the effect of temperature and time: if the color of the square is lighter than the circle around it, the vaccine can be used, either if the color of the square is the same as the color of the circle around it or Darker pollen should be destroyed. The Vaccine Vial Monitor measures cumulative heat exposure.

Controlled temperature range (CTC)

Only during some mass immunization campaigns, some vaccines approved for use in the controlled temperature range can be transported and used outside the cold chain for a limited period of time. In order for the vaccine to be used within the controlled temperature range it must be able to withstand a temperature of up to 40°C, when removed from the cold chain (temperature 2-8°C), for at least 3 days. The maximum temperature of 40 °C is monitored using the maximum threshold indicator found on vaccine vectors used for transportation and field immunization. The relative humidity in the store should not exceed 65% (there are many devices that can measure humidity). Air is considered a degradation factor for the drug because of the oxygen and moisture it contains, so all containers must be kept closed. Medicines shall be protected from air and moisture in sealed, dark containers of the type used in hospitals. Taking them out too long before distribution should be avoided. Patients who have received film-coated packets should be instructed to remove the tablets from them only when used. Medications should not be exposed to direct light, especially solutions. Injectable medicines should be kept in the original container, away from light. Some tinted glass can give the illusion of protection from light.

Deterioration of the drug

It is necessary to know the normal characteristics of each drug (colour, odor, solubility, and consistency) to monitor for any change, which may indicate deterioration of the drug. It is necessary to know that the deterioration of the drug does not always lead to noticeable external changes. The primary consequence of drug degradation is a lack of therapeutic efficacy, which can lead to serious consequences both individually and collectively. For example, the use of expired or stale, and therefore less effective, antimicrobials not only leads to incurable infections, but also contributes to the emergence of drug-resistant strains. It is not recommended to compensate for the potential decrease in efficacy by increasing the usual dose indiscriminately because, for toxic drugs, there is a real risk of overdosage. Some drugs deteriorate over time, resulting in more dangerous substances and thus increased toxicity. Tetracycline is an example: the pale yellow powder becomes brown and viscous, and thus becomes dangerous to use even before its expiry date. Hypersensitivity may occur with some drugs, eg penicillins and cephalosporins. Rectal suppositories, vaginal ovules, creams and ointments that have melted due to heat should not be used. As the active substance is no longer distributed in a homogeneous manner with the medicine. ORS can be used as long as it is in the form of a white powder. Moisture turns it into a slightly brown, insoluble, pasty mass: it is unsuitable for use, regardless of its expiration date.

Expiration

Medicines deteriorate gradually as a result of several processes, even if they are preserved under appropriate conditions. In most countries, laws require manufacturers to study the stability of their products under standardized conditions to ensure a minimum shelf life. The expiration date specified by the manufacturer indicates that the therapeutic effect of the drug has not changed until this date (at least 90% of the active substance is present in the drug and no significant increase in toxicity has occurred). The expiry date stated on the package is based on the stability of the medicine inside its original closed package. Common guaranteed periods are 3 years and 5 years, and some less stable materials are guaranteed for 1 or 2 years. The expiration date must be stated on the packages along with any preservation and storage requirements. The expiration date must be respected from the legal point of view and from the point of view of therapeutic responsibility. In cases where only expired medicines are available, the doctor can take responsibility for using those medicines. It is understood that

the medicine does not become unusable the day following its expiry date. In the event that the drug is preserved according to appropriate conditions (protection from moisture and light, in an intact package, and at a medium temperature) and if no changes in its external form or solubility are detected, it may often be preferable to use an expired drug rather than leaving a patient in a dangerous condition without treatment. The expiry date of medicines with precise doses must be compulsorily respected and which lead to the risk of under dosage such as heart tonics and antiepileptics, and drugs that may become toxic such as tetracyclines. Disposing of expired or unusable medicines and supplies. Throwing out expired or unusable medicines or burying them in the ground without caution is dangerous. For more information on medication disposal.

CONCLUSION

Preservatives or chemical additive in drugs and personal care products help prevent contamination and the growth of harmful bacteria in beauty products ranging from sunscreens, lotions, and shampoos to detergents, toothpaste, and makeup. Antimicrobial preservatives in cosmetics and personal care products help prevent the growth of fungi, yeasts and bacteria and protect against contamination that can cause skin irritation or infection. Antioxidant preservatives can also help prevent personal care products from spoiling by preventing reactions that can occur when certain ingredients in cosmetics or personal care products combine with oxygen in the presence of light, heat, and certain minerals.

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Citation: Ali WH, et al. (2023). The Catalysis of Temperature and Drug Packing Systems on the Chemical Additives of Drug. Catalysis Research. 3(3):14.

DOI: https://doi.org/10.35702/catalres.10014