Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Biology : Period \_\_\_\_\_\_ Guided Notes

Biotechnology Applications in Science – Freeze Drying

What is **FREEZE DRYING**?

* Freeze drying, or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, is the removal of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ typically through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* STABILITY: Water removal allows for product storage in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ containers or packages for up to \_\_\_\_\_\_\_\_ years.

What do people freeze dry?

* Major areas in which we see freeze drying are:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **Category of products** | **Sample of dried items** | **Why do people dry them?** |
| Food |  |  |
|  | Vitamins, antibiotics, blood plasma |  |
| Wildlife and Taxidermy | Flowers, small animals, pets! |  |

How does it work?

* Pre-freeze samples – as you want it to sublimate, samples must start \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Turn on the ­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ -once the temperature drops well below \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the vacuum pump will also start.
* Attach samples in glassware to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. You will turn the knob to open the connection between your sample and the freeze dryer.

In Summary - Freeze Drying

* Despite the size of the freeze dryer, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dryers allow different products to be safely stabilized and stored for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Freeze drying, while a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ process, has allowed the safe travel of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for extended time and distances.

**Summary Questions**

1. What are three benefits of using freeze drying techniques?
2. How has the use of freeze drying impacted the pharmaceutical world within the United States? What about outside of the US?
3. What are three benefits of freeze drying perishable foods?