Name _____ Date _____ Period _____

Properties of Matter and Separation Techniques

1. Differentiate between chemical and physical properties. Provide an example of each.

2. A spherical, helium-filled balloon has a diameter of 21.3 cm.   The density of helium is 0.1786 g/L. How many moles of helium are contained within the balloon?

3. Earth's atmosphere is 78% N_2 (boiling point: -196°C), 21% O_2 (boiling point: -183°C) and 1% water vapor, Ar, and other gases.
   a. Use an Internet search or other reference to find information to help you estimate the density of Earth's atmosphere. Indicate the temperature for your prediction.

   b. Briefly describe how you would separate nitrogen and oxygen from air.

4. Which is more buoyant, Helium gas or the gases that make up Earth's atmosphere? Which is a pure substance? A mixture?

5. A cylindrical water tower is 6.16 m high and 0.75 m in diameter and is completely filled with water. If the water has a mass of 2.9 x10^3 kg, find the density of the water in the tower.

6. What are the two types of vaporization? Differentiate between them.

7. Explain why liquid water evaporates. Include a drawing in *particle view* to accompany your explanation.

8. Devise a simple protocol for separating a mixture of sand, sugar, and iron filings. Each material must be recovered in its original solid form. Protocols should consist of numbered, imperative steps that are detailed enough to follow.

9. Briefly describe how chromatography separates the substances in a mixture.

10. Which process requires more energy: chromatography or distillation? Explain.