

# Matter Study Guide

1. Samantha cools 100g of gaseous Nitrogen ( $N_2$ ) until it becomes liquid and then cools it even more until it becomes a solid. Explain what happens to the energy of the molecules as the temperature is lowered. (S8P1c)

2. Why does matter expand when it is heated?

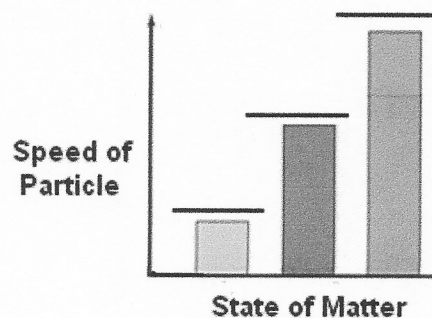
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3. Draw a diagram to the right that shows the molecular change of ice to water.

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4. Use the states of matter Solid, Liquid, and Gas to answer the questions below.

a. Write the states of matter in sequence based on loss of energy (example: state of matter with the most energy, then the state of matter with less energy than the first and so on)



b. Finish the bar graph to the right illustrating the speed of particles in the states of matter.

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5. Use the following information to answer the questions below: 1 kg of silver melts at  $960.8^\circ C$  (S8P1d)

a. 500g of silver melts at \_\_\_\_\_.

b. Freezing point of silver \_\_\_\_\_.

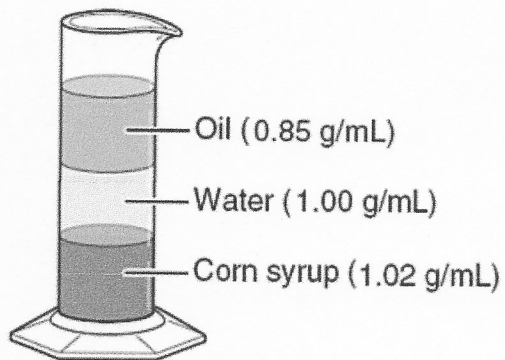
6. Describe the molecular arrangement of a solid.

7. Fill in the table below with the Physical and Chemical Properties of Matter

| Type of Property | Property       | Description |
|------------------|----------------|-------------|
|                  | Density        |             |
|                  | Melting point  |             |
|                  | Boiling point  |             |
|                  | Reactivity     |             |
|                  | Combustibility |             |

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8. Silver is a white metal that is an excellent conductor of heat and electricity. Silver tarnishes when exposed to air and light. The density of silver is  $10.49 \text{ g/cm}^3$ . The melting point is  $962^\circ\text{C}$  and the boiling point is  $2000^\circ\text{C}$ . Identify the physical properties of Silver based on the information above.



9. Based on the diagram, which type and property of matter could be used to classify oil, water, and corn syrup?

| Densities of Some Unknowns |                |
|----------------------------|----------------|
| Liquids                    | Density (g/mL) |
| Sample A                   | 1.02           |
| Sample B                   | 0.96           |
| Sample C                   | 1.15           |
| Sample D                   | 0.82           |

10. Four additional samples were measured and recorded as shown in the table below. Which of the samples will probably float on top of the oil? Explain your answer.

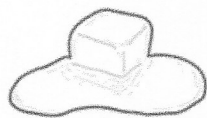
11. A student divides several cubes into two groups, based on whether or not each cube can float in water. What property is the student using to classify the cubes?

12. A popsicle melting is an example of what type of change? Explain your answer.

13. Compare and contrast the changes of state in chopping wood and burning wood.



A match is lit, creating a yellow-orange flame.



A small piece of ice melts, changing from a solid to a liquid.



A pot of water is heated to boiling, and evaporation occurs.



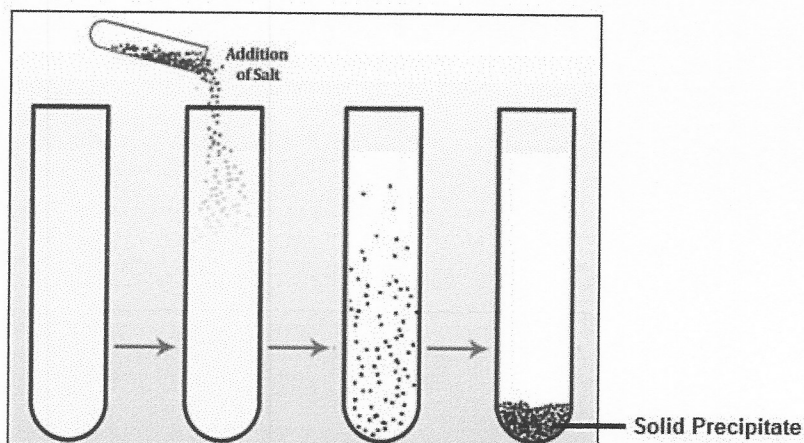
A ball of clay sinks in water, and floats when reshaped.

14. Look at the diagram above. Identify which examples are physical changes and which are chemical changes. Explain why.

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15. Describe evidence that suggests a change in the state of matter is a chemical change instead of a physical change.

16. The diagram to the right illustrates a chemical change. Explain why this is a chemical change.



17. Tabitha tried to open a jar of pickles, but the top of the jar was stuck. The pickle jar was glass with a metal lid. Tabitha ran hot water over the metal lid. After a few minutes, Tabitha was able to open the jar. Explain what happened. Describe the relationship between the temperature of the metal lid and the speed of the molecules.

## Matter [1] Review

18. What is the smallest particle of the element iron (Fe) that can still be classified as iron?

19. One oxygen and two hydrogen atoms combine to form \_\_\_\_\_.

20. The chemical formula for ethanol is  $\text{CH}_3\text{CH}_2\text{OH}$ . How many different elements make up one molecule of ethanol?

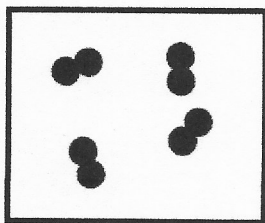
21. A pure substance that can be separated into two or more simpler substances by chemical means is \_\_\_\_\_.

22. Which of the following do and do not represent a compound:  $\text{O}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ,  $\text{H}_2$ , Na Explain your answer.

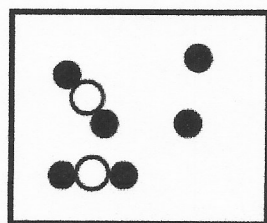
23. Why are substances classified together on the periodic table?

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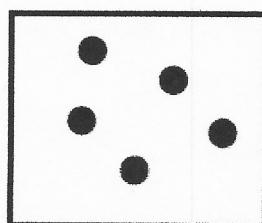
Use the diagram below to answer questions 23-25



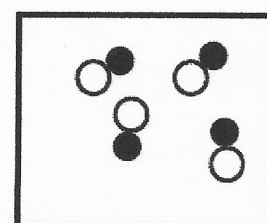
**A**



**B**



**C**



**D**

24. What does each circle and dot represent in the diagrams above?

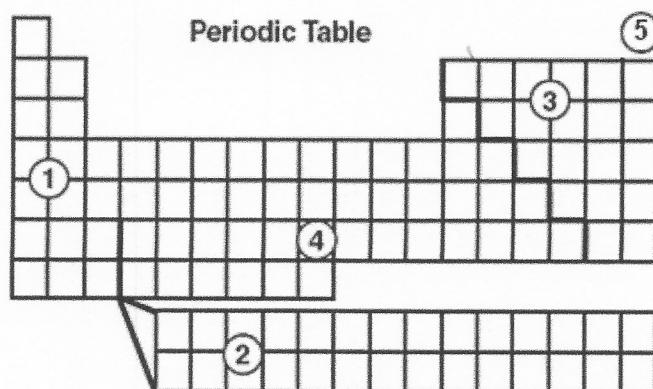
25. Which diagram(s) above represents a pure substance?

26. Which diagram(s) above represents a mixture?

27. In which region of the table would nonmetals be found?

28. In which region would the most reactive elements be found?

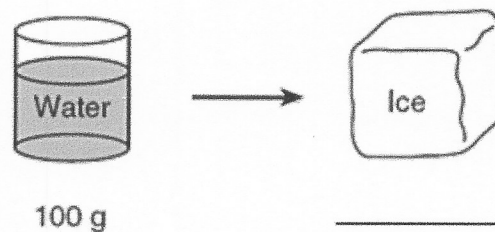
29. What does the zigzag line on the Periodic Table to the right indicate?



30. Which sample equation best illustrates the law of conservation of mass?

- A. 4 grams reactant U + 3 grams reactant V → 7 grams product W
- B. 12 grams reactant X + 10 grams reactant Y → 2 grams product Z
- C. 5 grams reactant E + 5 grams reactant F → 20 grams product G + 5 grams product H
- D. 10 grams reactant Q + 9 grams reactant R → 90 grams product S + 90 grams product T

31. What concept does the diagram to the right illustrate?



32. What is the missing mass of the ice cube in the diagram to the right?

(Not drawn to scale)