Physical Science Mid-Term Assessment **Class:** _____

Name: _____ **Date:** _____

1. Which statement *correctly* describes a property of a type of matter?

   (1) Air is a mixture of gases.

   (2) Ice is a mixture of gases.

   (3) Air is a liquid.

   (4) Ice is a liquid.

2. Use the Periodic Table of Elements to answer the following question(s).

   Which sentence about the periodic table of elements is *true*?

   (1) All elements in period 2 are metals.

   (2) All elements in group 18 are metals.

   (3) Metals are found on the left side of the periodic table.

   (4) Metals are found on the right side of the periodic table.

3. Copper (Cu) reacts with oxygen (O) to form copper oxide (CuO). The properties of CuO are *most* likely

   (1) different from copper or oxygen.

   (2) similar to both copper and oxygen.

   (3) similar only to copper.

   (4) similar only to oxygen.

4. Generally, how do atomic masses vary throughout the periodic table of the elements?

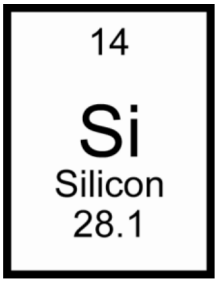
   (1) They increase from left to right and top to bottom.

   (2) They increase from left to right and bottom to top.

   (3) They increase from right to left and top to bottom.

   (4) They increase from right to left and bottom to top.

5. Use this element from the periodic table to answer the question.



   What is the atomic mass for silicon?

   (1) 14.0 (2) 14.1 (3) 28.1 (4) 42.1

6. Anita has a small sample of an unknown element that she is trying to identify. Anita divides the mass of the sample by its volume.

   Which property of matter is Anita using to identify the element?

   (1) Weight (3) Texture

   (2) Density (4) Freezing point

7. What causes an object to have a positive charge?

   (1) Protons are removed.

   (2) Protons are added.

   (3) Electrons are removed.

   (4) Electrons are added.

8. Which molecule represents an element?

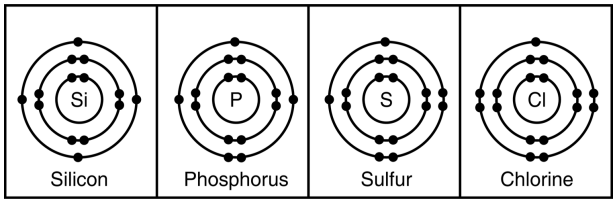
   (1) bromine gas (Br_2)

   (2) carbon dioxide (CO_2)

   (3) hydrogen fluoride (HF)

   (4) sodium chloride (NaCl)

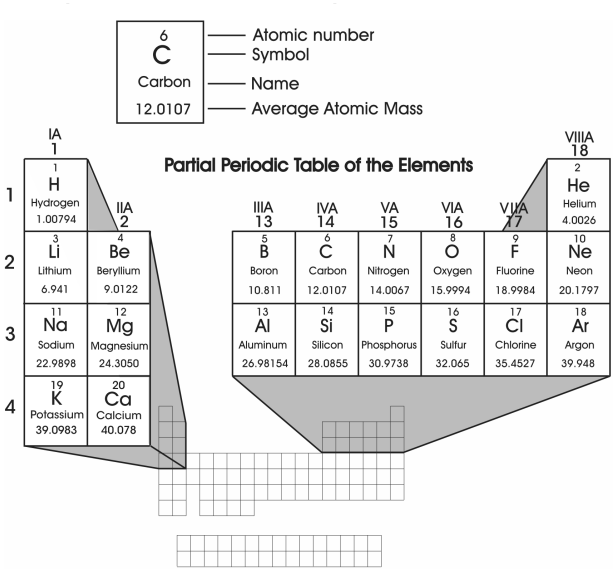
9. Use the diagram below to answer the following question.



Which element will gain only one electron during a chemical reaction?

(1) silicon
(2) phosphorus
(3) sulfur
(4) chlorine

10.



Would you normally expect neon (Ne) to form compounds?

(1) Yes, but neon is a rare gas and difficult to obtain.

(2) No, neon needs six electrons to fill its outermost level.

(3) Yes, neon needs six electrons to fill its outermost level.

(4) No, neon has eight electrons in its outermost level and is stable.

11. According to the periodic table, which statement correctly describes the change from a neutral atom of an element to its ion?

(1) A fluorine atom forms a F^{-1} ion by losing one electron.

(2) A sodium atom forms a Na^{+1} ion by losing two electrons.

(3) A magnesium atom forms a Mg^{+2} ion by gaining two electrons.

(4) A phosphorus atom forms a P^{-3} ion by gaining three electrons.

12. Use the table to answer the following question.

Data Table

Substance	Number of Protons	Number of Electrons
lithium	3	2
fluorine	9	10
potassium	19	19
sulfur	16	18

Which substance is electrically neutral?

(1) lithium
(2) fluorine
(3) potassium
(4) sulfur

13. Which is an example of a chemical reaction?

(1) nails rusting
(2) glass melting
(3) sugar dissolving
(4) alcohol vaporizing

14. Different arrangements of atoms are shown in the figures below.

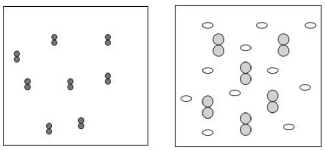


Figure 1

Figure 3

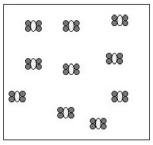


Figure 2

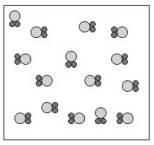
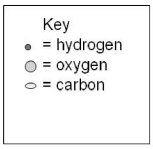


Figure 4



Which figure represents a mixture?

(1) Figure 1
(2) Figure 2
(3) Figure 3
(4) Figure 4

15. Which of the following forms of energy is released or absorbed in *most* chemical reactions?

(1) light energy
(2) electrical energy
(3) sound energy
(4) heat energy

16. $\_\_\_\_ NH_3(g) + \_\_\_\_ O_2(g) \rightarrow \_\_\_\_ N_2(g) + \_\_\_\_ H_2O(g)$

When the reaction above is completely balanced, the coefficient for NH_3 will be

(1) 2. (2) 3. (3) 4. (4) 6.

17. $\mathbf{2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)}$

s = solid

g = gas

The equation represents a chemical change because _____.

(1) it is balanced
(2) the product is solid
(3) a new substance is produced
(4) there are two substances on the reactant side

18. Which of the following is an example of a chemical change?

(1) burning a scented candle
(2) cutting an apple into slices
(3) freezing liquid water into an ice cube
(4) melting a stick of butter to pour over popcorn

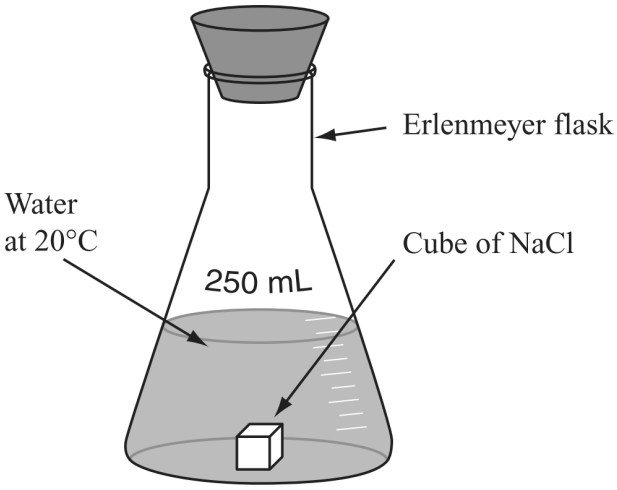
19. Which of the following statements describes the difference between endothermic and exothermic chemical reactions?

(1) Energy is absorbed in endothermic reactions but is released in exothermic reactions.
(2) Energy is conserved in endothermic reactions but is not conserved in exothermic reactions.
(3) Endothermic reactions involve changes in the nucleus of an atom, but exothermic reactions do not involve changes in the nucleus.
(4) Endothermic reactions occur when electrons are shared between atoms, but exothermic reactions occur when electrons are transferred between atoms.

20. Of four different laboratory solutions, the solution with the *highest* acidity has a pH of

(1) 11. (2) 7. (3) 5. (4) 3.

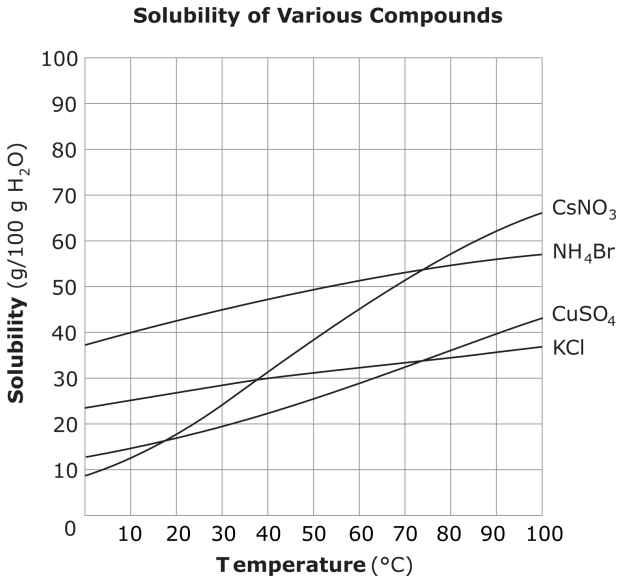
21. The diagram below shows a cube of sodium chloride beginning to dissolve in water.



Which of the following changes will cause the cube to dissolve more quickly?

(1) swirling the flask
(2) removing the stopper
(3) pouring off half the water
(4) decreasing the water temperature

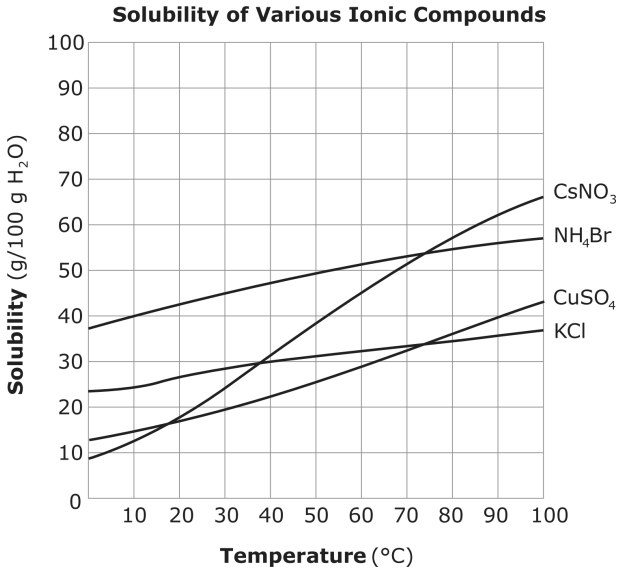
22. The graph below shows the solubility of various compounds.



At what temperature will 50 g of NH_4Br produce a saturated solution when dissolved in 100 g of water?

(1) 48° C (2) 54° C (3) 60° C (4) 66° C

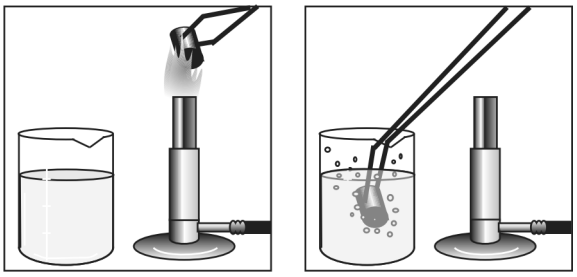
23. This graph shows the solubility curves for various ionic compounds.



At which temperature does KCl have the same solubility as $CuSO_4$?

(1) 18° C (2) 38° C (3) 73° C (4) 100° C

24. A piece of metal is heated in a Bunsen burner flame and then immersed in a beaker of cool water.



Which statement *best* describes the effect of the temperature changes on the kinetic energy of the particles?

(1) Kinetic energy of metal atoms decreases in the flame.

(2) Kinetic energy of water molecules increases when the heated metal is immersed.

(3) Kinetic energy of water molecules decreases when the heated metal is immersed.

(4) Kinetic energy of metal atoms increases when immersed in the cooler water.

25. Which statement *correctly* describes both gases and liquids?

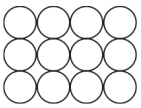
(1) Their shapes stay the same in any container.

(2) Their shapes change when they are in different containers.

(3) Their volumes stay the same in any container.

(4) Their volumes change when they are in different containers.

26. A scientist uses an instrument to observe the pattern of molecules in a substance. The picture below shows what the scientist sees.



What state of matter is the scientist *most* likely observing?

(1) gas (2) liquid (3) vapor (4) solid

27. The random molecular motion of a substance is greatest when the substance is

(1) condensed.
(2) a liquid.
(3) frozen.
(4) a gas.

28. Which of the following is an example of a physical change but *not* a chemical change?

(1) A log gives off heat and light as it burns.
(2) A tree stores energy from the Sun in its fruit.
(3) A penny lost in the grass slowly changes color.
(4) A water pipe freezes and cracks on a cold night.

29. When a sample of a gas is cooled, it condenses into a liquid. In which of the following ways do the molecules of the original gas sample compare with the molecules of the liquid?

(1) The molecules are larger as a gas than they are as a liquid.
(2) The molecules weigh less as a gas than they do as a liquid.
(3) The molecules move faster as a gas than they do as a liquid.
(4) The molecules are closer together as a gas than they are as a liquid.

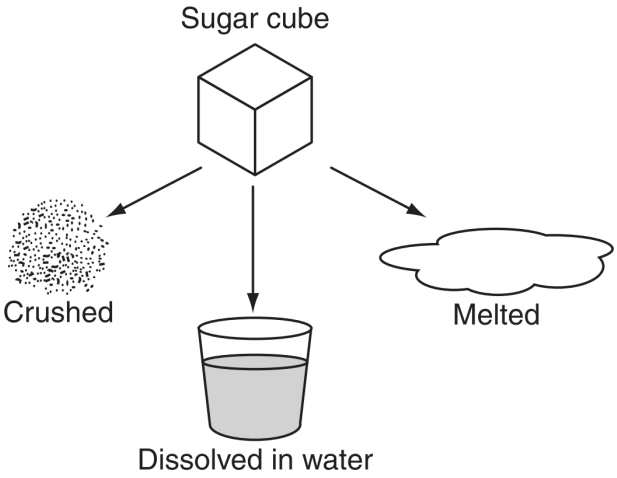
30. Which is an example of a physical change?

(1) boiling
(2) burning
(3) rotting
(4) rusting

31. Which term describes when a substance is changed from a liquid to a gas?

(1) Condensation
(2) Evaporation
(3) Filtration
(4) Precipitation

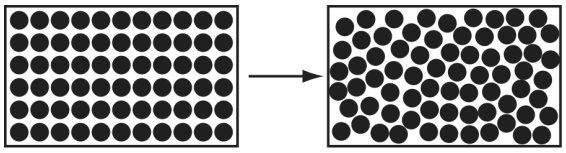
32. The diagram below shows three different ways that a sugar cube can undergo a physical change.

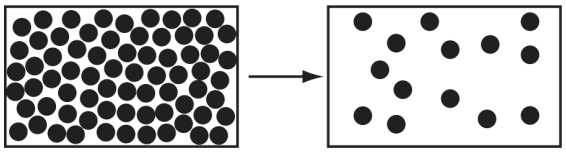


Which characteristic of the sugar cube does not change?

(1) shape (2) state (3) weight (4) texture

33. Which diagram represents the change of ice to water?

(1)


(2)


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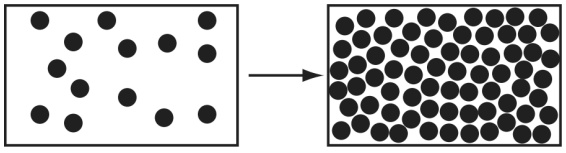
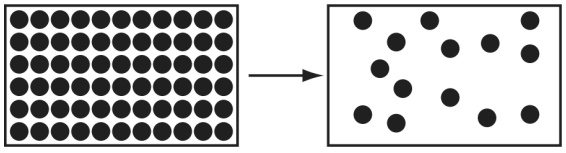


(4)


34. A scientist is performing an experiment to determine the melting point of a new substance. Which action could increase the likelihood of obtaining accurate results?

(1) repeating the experiment three times

(2) experimenting with multiple substances

(3) writing out the procedure after the experiment

(4) using three types of thermometers in the experiment

35. Which statement is an **observation**?

(1) The plant has flowers.

(2) The plant is very pretty.

(3) The plant will grow berries.

(4) The plant might be poisonous.

36. A fertilizer company claims that their fertilizer causes rose bushes to produce more flowers. To support this claim, they set up an investigation. They added the recommended amount of fertilizer to 100 rose bushes in a greenhouse, and then they counted the number of flowers that developed on each plant. The number of flowers on each rose bush ranged from 28 to 36. The mean number of flowers on each plant was 33.

A gardener was skeptical of the company's claim. Which statement provides the *best* reason to be skeptical?

(1) The sample size was too small to be valid.

(2) The investigation tested only one variable.

(3) The research was conducted without a control.

(4) The investigation was conducted only on rose plants.

37. The jackrabbit population sometimes decreases dramatically. One possible explanation for this decrease is that the coyote population has increased. This explanation is a scientific

(1) conclusion.

(2) experiment.

(3) hypothesis.

(4) law.

38. A drug company tests a new blood pressure medication before getting FDA approval to market the drug to the public. Pills containing no medication are given to 500 people in Group I, and pills containing the new medication are given to 500 people in Group II.

In this experiment, Group I serves as the

(1) control group

(2) experimental group

(3) dependent variable

(4) independent variable

39. Which of these should be done before beginning a laboratory investigation?

(1) collect data

(2) review the procedure

(3) draw conclusions

(4) record data on tables

40. An example of a heterogeneous mixture is

(1) soil

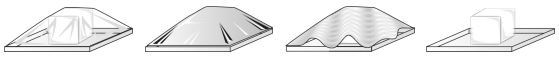
(2) sugar

(3) carbon monoxide

(4) carbon dioxide

41. Use the information below to answer the following question(s).

A student conducts an experiment at home to test the effect of different covers on the melting rate of ice. The student places identical ice cubes on separate trays of known mass. The student covers each tray as shown below.



The trays are placed on the same table. After ten minutes, the student removes the covers, discards the excess water, and calculates the mass of each ice cube.

Which of these is the dependent variable in the experiment?

(1) shape of each ice cube

(2) mass of each ice cube

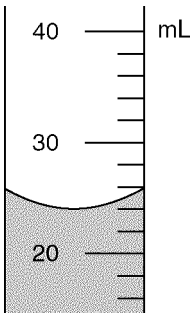
(3) temperature of the ice cubes

(4) material covering the ice cubes

42. When magnesium (Mg) metal is burned in the presence of oxygen (O_2), magnesium oxide (MgO) is produced. The properties of magnesium oxide are different than the individual properties of magnesium and oxygen because magnesium oxide is

(1) a solution.
(2) a mixture.
(3) a compound.
(4) an element.

43. The diagram below shows a portion of a graduated cylinder.



What is the volume of the liquid in this cylinder?

(1) 22 mL (2) 24 mL (3) 25 mL (4) 26 mL

44. Pablo wondered if different colored sand heats up differently in light. He set up two beakers, one containing 50 grams (g) of light-colored sand and the other with 50 g of dark-colored sand. He placed the beakers side by side under a lamp. He measured the temperature of the sand in each beaker every two minutes and recorded his results in the table below.

Experiment Results

Time (minutes)	Temperature in degrees Celsius (°C)	
	Light-Colored Sand	Dark-Colored Sand
0	14	18
2	18	25
4	22	29
6	24	37
8	28	40
10	32	44

Which variable did Pablo forget to control during his investigation?

(1) The experiment should have lasted longer.
(2) The experiment was not completed outdoors.
(3) The beakers of sand did not start at the same temperature.
(4) The beakers of sand were not collected from the same area.

45. The following chart shows the height of a plant over a 6-week period.

Plant Growth

Week	Height (centimeters)
1	2
2	4
3	6
4	9
5	10
6	12

Which statement describes the growth of the plant?

(1) The plant grew the least between weeks 1 and 2.

(2) The plant grew the most between weeks 3 and 4.

(3) The plant grew exactly two centimeters each week.

(4) The plant grew until week 4, and then it stopped growing.

46. In the boxes below:

a) Draw two different compounds, one in each box, using the representations for atoms of element X and element Z given below.

Atom of element X = ○
Atom of element Z = ●

b) Draw a mixture of these two compounds.

47. **GM Rice Safety**

A biotech company produces a new genetically modified (GM) variety of rice. It claims the rice is as safe for humans to eat as non-GM rice. Due to public concern, the company agrees to have its researchers perform a study using rats to test the safety of its product. Researchers planned the following study.

- Rats in study group 1 will receive GM rice.
- Rats in study group 2 will receive non-GM rice.
- Both groups of rats will be of the same species.
- The trials will last for 6 months.
- Data on final weight, overall health, and/or death rate will be collected for each group.

a) Identify *two* additional factors that the researchers need to hold constant in order to ensure that their results are valid.

b) Explain why these factors need to be held constant.

48. Mr. Alves was testing for physical and chemical changes. First, he combined baking soda with vinegar and observed bubbles forming. Next, Mr. Alves put an ice cube in an empty glass and watched it melt.

Complete the table below by identifying each change as physical or chemical, and give an explanation for each change.

Action	Physical/ Chemical	Explanation
Combining Baking Soda and Vinegar		
Ice Cube Melting		

Finally, Mr. Alves took a potato out of a bag.

- Name a physical change that can happen to the potato. Explain how you know that it is a physical change.
- Name a chemical change that can happen to the potato. Explain how you know that it is a chemical change.