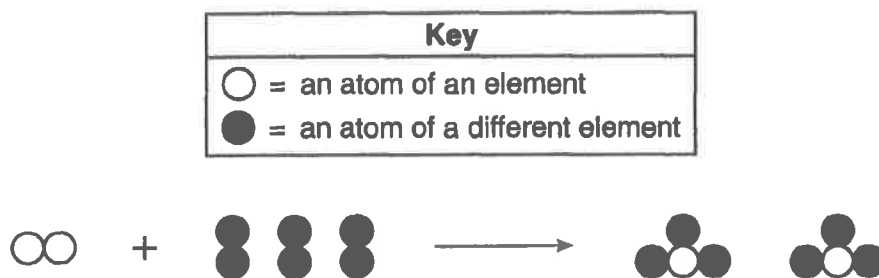


- Which process results in a chemical change?
  - tearing tin foil
  - melting an iron bar
  - crushing an aluminum can
  - burning magnesium ribbon
- Which statement describes a chemical property of aluminum?
  - Aluminum is malleable.
  - Aluminum reacts with sulfuric acid.
  - Aluminum conducts an electric current.
  - Aluminum has a density of  $2.698 \text{ g/cm}^3$  at STP.
- Particles are arranged in a crystal structure in a sample of
  - $\text{H}_2(\text{g})$
  - $\text{Br}_2(\text{l})$
  - $\text{Ar}(\text{g})$
  - $\text{Ag}(\text{s})$
- Which statement describes a chemical property of bromine?
  - Bromine is soluble in water.
  - Bromine has a reddish-brown color.
  - Bromine combines with aluminum to produce  $\text{AlBr}_3$ .
  - Bromine changes from a liquid to a gas at  $332 \text{ K}$  and  $1 \text{ atm}$ .
- At STP, which 2.0-gram sample of matter uniformly fills a 340-milliliter closed container?
  - $\text{Br}_2(\text{l})$
  - $\text{Fe}(\text{NO}_3)_2(\text{s})$
  - $\text{KCl}(\text{aq})$
  - $\text{Xe}(\text{g})$
- Which phase change results in the release of energy?
  - $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\text{l})$
  - $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\text{g})$
  - $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{g})$
  - $\text{H}_2\text{O}(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l})$
- In a laboratory where the air temperature is  $22^\circ\text{C}$ , a steel cylinder at  $100.^\circ\text{C}$  is submerged in a sample of water at  $40.^\circ\text{C}$ . In this system, heat flows from
  - both the air and the water to the cylinder
  - both the cylinder and the air to the water
  - the air to the water and from the water to the cylinder
  - the cylinder to the water and from the water to the air
- Object *A* at  $40.^\circ\text{C}$  and object *B* at  $80.^\circ\text{C}$  are placed in contact with each other. Which statement describes the heat flow between the objects?
  - Heat flows from object *A* to object *B*.
  - Heat flows from object *B* to object *A*.
  - Heat flows in both directions between the objects.
  - No heat flow occurs between the objects.
- Which temperature is equal to  $120. \text{ K}$ ?
  - $-153.^\circ\text{C}$
  - $-120.^\circ\text{C}$
  - $+293.^\circ\text{C}$
  - $+393.^\circ\text{C}$

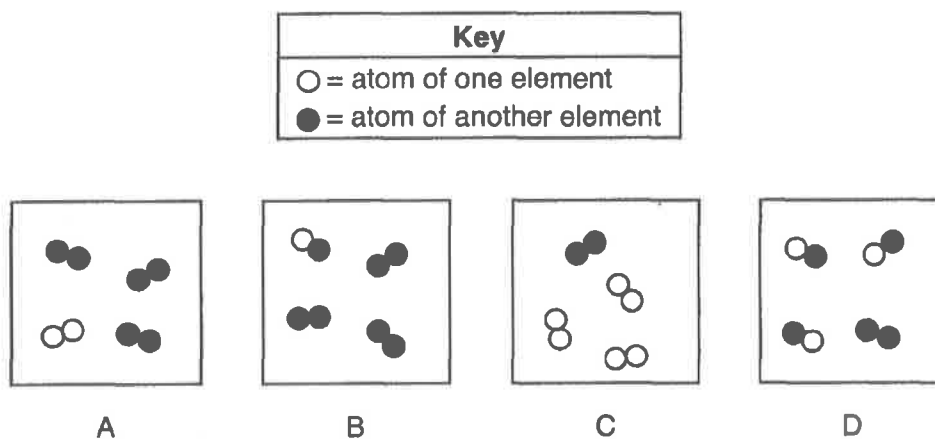
10. Given the balanced particle-diagram equation:



Which statement describes the type of change and the chemical properties of the product and reactants?

- 1) The equation represents a physical change, with the product and reactants having different chemical properties.
- 2) The equation represents a physical change, with the product and reactants having identical chemical properties.
- 3) The equation represents a chemical change, with the product and reactants having different chemical properties.
- 4) The equation represents a chemical change, with the product and reactants having identical chemical properties.

11. Which two particle diagrams represent mixtures of diatomic elements?



- 1) *A and B*                      2) *A and C*                      3) *B and C*                      4) *B and D*

12. What is the equivalent of 0 Kelvin on the Celsius scale?

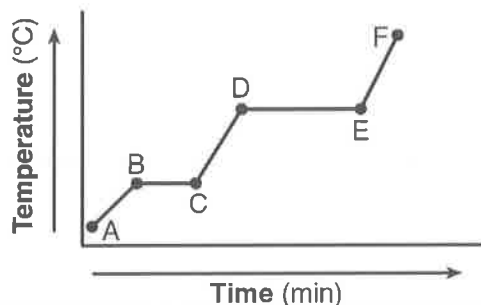
- 1)  $-100^{\circ}$                       3)  $-273^{\circ}$   
 2)  $100^{\circ}$                       4)  $273^{\circ}$

13. The temperature 30. K expressed in degrees Celsius is

- 1)  $243^{\circ}\text{C}$                       3)  $303^{\circ}\text{C}$   
 2)  $-243^{\circ}\text{C}$                       4)  $-303^{\circ}\text{C}$

14. What occurs when a 35-gram aluminum cube at  $100.^{\circ}\text{C}$  is placed in 90. grams of water at  $25.^{\circ}\text{C}$  in an insulated cup?
- 1) Heat is transferred from the aluminum to the water, and the temperature of the water decreases.
  - 2) Heat is transferred from the aluminum to the water, and the temperature of the water increases.
  - 3) Heat is transferred from the water to the aluminum, and the temperature of the water decreases.
  - 4) Heat is transferred from the water to the aluminum, and the temperature of the water increases.
15. The temperature of a sample of matter is a measure of the
- 1) average kinetic energy of its particles
  - 2) average potential energy of its particles
  - 3) total kinetic energy of its particles
  - 4) total potential energy of its particles
16. Which sample of water contains particles having the highest average kinetic energy?
- 1) 25 mL of water at  $95^{\circ}\text{C}$
  - 2) 45 mL of water at  $75^{\circ}\text{C}$
  - 3) 75 mL of water at  $75^{\circ}\text{C}$
  - 4) 95 mL of water at  $25^{\circ}\text{C}$
17. Which process is exothermic?
- 1) boiling of water
  - 2) melting of copper
  - 3) condensation of ethanol vapor
  - 4) sublimation of iodine
18. Which phase change is exothermic?
- 1) solid to liquid
  - 2) solid to gas
  - 3) liquid to solid
  - 4) liquid to gas
19. The boiling point of a liquid is the temperature at which the vapor pressure of the liquid is equal to the pressure on the surface of the liquid. What is the boiling point of propanone if the pressure on its surface is 48 kilopascals?
- 1)  $25^{\circ}\text{C}$
  - 2)  $30.^{\circ}\text{C}$
  - 3)  $35^{\circ}\text{C}$
  - 4)  $40.^{\circ}\text{C}$
20. Which phase change is accompanied by the release of heat?
- 1)  $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\text{g})$
  - 2)  $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\ell)$
  - 3)  $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{g})$
  - 4)  $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{s})$
21. Which change of phase is exothermic?
- 1) solid to liquid
  - 2) gas to liquid
  - 3) solid to gas
  - 4) liquid to gas
22. Which physical changes are endothermic?
- 1) melting and freezing
  - 2) melting and evaporating
  - 3) condensation and sublimation
  - 4) condensation and deposition
23. A 36-gram sample of water has an initial temperature of  $22^{\circ}\text{C}$ . After the sample absorbs 1200 joules of heat energy, the final temperature of the sample is
- 1)  $8.0^{\circ}\text{C}$
  - 2)  $14^{\circ}\text{C}$
  - 3)  $30.^{\circ}\text{C}$
  - 4)  $55^{\circ}\text{C}$
24. The temperature of a sample of water changes from  $10^{\circ}\text{C}$  to  $20^{\circ}\text{C}$  when the sample absorbs 418 joules of heat. What is the mass of the sample?
- 1) 1 g
  - 2) 10 g
  - 3) 100 g
  - 4) 1000 g

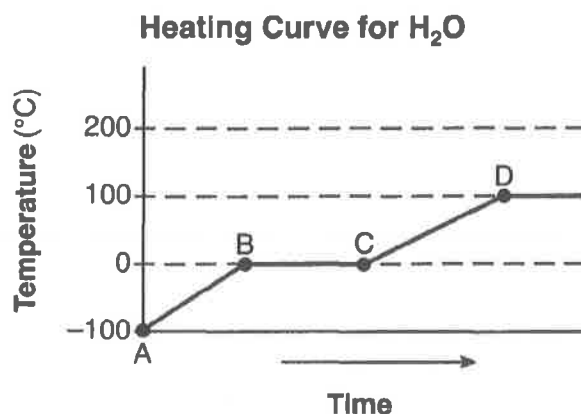
25. The graph below represents the uniform heating of a sample of a substance starting as a solid below its melting point.



Which statement describes what happens to the energy of the particles of the sample during time interval *DE*?

- 1) Average kinetic energy increases, and potential energy remains the same.
  - 2) Average kinetic energy decreases, and potential energy remains the same.
  - 3) Average kinetic energy remains the same, and potential energy increases.
  - 4) Average kinetic energy remains the same, and potential energy decreases
26. The temperature of a sample of water changes from  $10.^{\circ}\text{C}$  to  $20.^{\circ}\text{C}$  when the water absorbs 420 Joules of heat. What is the mass of the sample?
- 1) 1.0 g
  - 2) 10. g
  - 3) 100 g
  - 4) 1000 g
27. What is the minimum amount of heat required to completely melt 20.0 grams of ice at its melting point?
- 1) 20.0 J
  - 2) 83.6 J
  - 3) 6,680 J
  - 4) 45,200 J
28. The freezing point of bromine is
- 1)  $539^{\circ}\text{C}$
  - 2)  $-539^{\circ}\text{C}$
  - 3)  $7^{\circ}\text{C}$
  - 4)  $-7^{\circ}\text{C}$

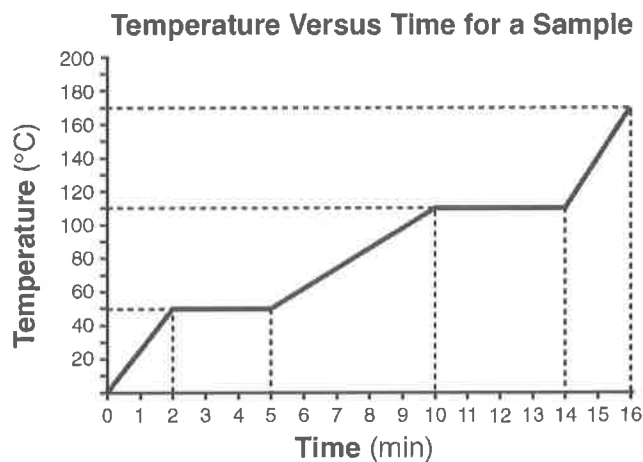
29. The graph below represents the relationship between temperature and time as heat is added to a sample of  $\text{H}_2\text{O}$



Which statement correctly describes the energy of the particles of the sample during interval *BC*?

- 1) Potential energy decreases and average kinetic energy increases.
  - 2) Potential energy increases and average kinetic energy increases.
  - 3) Potential energy increases and average kinetic energy remains the same.
  - 4) Potential energy remains the same and average kinetic energy increases.
30. At which Celsius temperature does lead change from a solid to a liquid?
- 1)  $874^{\circ}\text{C}$
  - 2)  $601^{\circ}\text{C}$
  - 3)  $328^{\circ}\text{C}$
  - 4)  $0^{\circ}\text{C}$
31. What amount of heat is required to completely melt a 29.95-gram sample of  $\text{H}_2\text{O}(\text{s})$  at  $0^{\circ}\text{C}$ ?
- 1) 334 J
  - 2) 2260 J
  - 3)  $1.00 \times 10^3 \text{ J}$
  - 4)  $1.00 \times 10^4 \text{ J}$

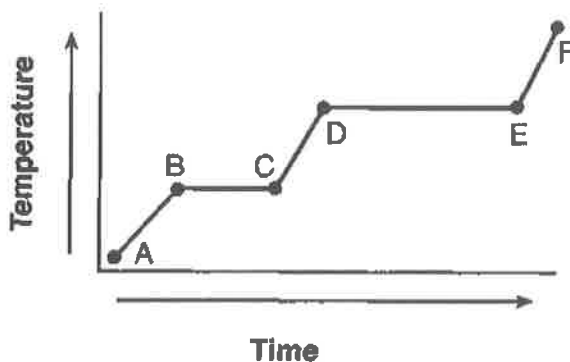
32. Starting as a solid, a sample of a substance is heated at a constant rate. The graph below shows the changes in temperature of this sample.



What is the melting point of the sample and the total time required to completely melt the sample after it has reached its melting point?

- 1) 50°C and 3 min
  - 2) 50°C and 5 min
  - 3) 110°C and 4 min
  - 4) 110°C and 14 min
33. What is the total number of joules released when a 5.00-gram sample of water changes from liquid to solid at 0°C?
- 1) 334 J
  - 2) 1670 J
  - 3) 2260 J
  - 4) 11 300 J
34. Which phase change is endothermic?
- 1)  $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{g})$
  - 2)  $\text{I}_2(\text{g}) \rightarrow \text{I}_2(\text{s})$
  - 3)  $\text{Hg}(\ell) \rightarrow \text{Hg}(\text{s})$
  - 4)  $\text{H}_2\text{S}(\text{g}) \rightarrow \text{H}_2\text{S}(\ell)$
35. Which formula represents a mixture?
- 1)  $\text{C}_6\text{H}_{12}\text{O}_6(\ell)$
  - 2)  $\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$
  - 3)  $\text{LiCl}(\text{aq})$
  - 4)  $\text{LiCl}(\text{s})$

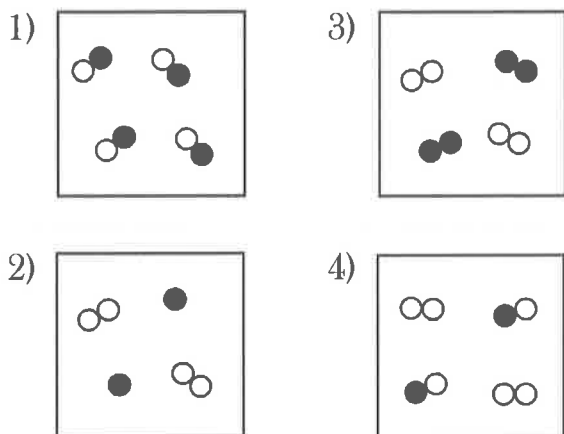
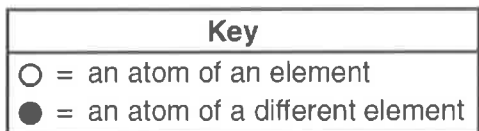
36. The graph below represents the uniform heating of a substance, starting below its melting point, when the substance is solid.



Which line segments represent an increase in average kinetic energy?

- 1)  $\overline{AB}$  and  $\overline{BC}$
  - 2)  $\overline{AB}$  and  $\overline{CD}$
  - 3)  $\overline{BC}$  and  $\overline{DE}$
  - 4)  $\overline{DE}$  and  $\overline{EF}$
37. How much energy is required to vaporize 10.00 grams of water at its boiling point?
- 1) 2.26 kJ
  - 2) 3.34 kJ
  - 3) 4.2 kJ
  - 4) 22.6 kJ
38. In which process does a solid change directly into a vapor?
- 1) condensation
  - 2) sublimation
  - 3) deposition
  - 4) solidification
39. Which substance will readily sublime at STP?
- 1)  $\text{Fe}(\text{s})$
  - 2)  $\text{C}_6\text{H}_{12}\text{O}_6(\text{s})$
  - 3)  $\text{NaCl}(\text{s})$
  - 4)  $\text{CO}_2(\text{s})$
40. Which phase change at STP represents sublimation?
- 1)  $\text{CO}_2(\text{s}) \rightarrow \text{CO}_2(\text{g})$
  - 2)  $\text{H}_2\text{O}(\text{s}) \rightarrow \text{H}_2\text{O}(\ell)$
  - 3)  $\text{CO}_2(\ell) \rightarrow \text{CO}_2(\text{g})$
  - 4)  $\text{H}_2\text{O}(\ell) \rightarrow \text{H}_2\text{O}(\text{s})$

41. Which particle diagram represents a mixture of an element and a compound?



42. A dilute, aqueous potassium nitrate solution is best classified as a

- 1) homogeneous compound
- 2) homogeneous mixture
- 3) heterogeneous compound
- 4) heterogeneous mixture

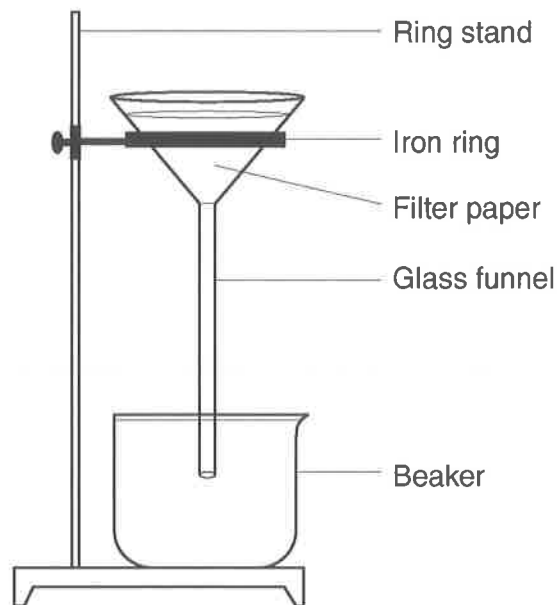
43. At room temperature, a mixture of sand and water can be separated by

- 1) ionization
- 2) combustion
- 3) filtration
- 4) sublimation

44. When a mixture of water, sand, and salt is filtered, what passes through the filter paper?

- 1) water, only
- 2) water and sand, only
- 3) water and salt, only
- 4) water, sand, and salt

45. Which mixture can be separated by using the equipment shown below?



- 1)  $\text{NaCl(aq)}$  and  $\text{SiO}_2(\text{s})$
- 2)  $\text{NaCl(aq)}$  and  $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq})$
- 3)  $\text{CO}_2(\text{aq})$  and  $\text{NaCl(aq)}$
- 4)  $\text{CO}_2(\text{aq})$  and  $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq})$

46. Recovering the salt from a mixture of salt and water could best be accomplished by

- 1) vaporization
- 2) filtration
- 3) paper chromatography
- 4) density determination

47. Petroleum can be separated by distillation because the hydrocarbons in petroleum are

- 1) elements with identical boiling points
- 2) elements with different boiling points
- 3) compounds with identical boiling points
- 4) compounds with different boiling point

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48. Which sample of matter can be separated into different substances by physical means?

- 1) LiCl(aq)                      3) NH<sub>3</sub>(g)  
2) LiCl(s)                        4) NH<sub>3</sub>(l)

49. A beaker contains both alcohol and water. These liquids can be separated by distillation because the liquids have different

- 1) boiling points            3) particle sizes  
2) densities                    4) solubilities

50. Which property makes it possible to separate the oxygen and the nitrogen from a sample of liquefied air?

- 1) boiling point            3) hardness  
2) conductivity            4) electronegativity
-

**Answer Key**  
**Matter Review [Sep 12, 2011]**

- |              |              |              |
|--------------|--------------|--------------|
| 1. <u>4</u>  | 21. <u>2</u> |              |
| 2. <u>2</u>  | 22. <u>2</u> |              |
| 3. <u>4</u>  | 23. <u>3</u> |              |
| 4. <u>3</u>  | 24. <u>2</u> |              |
| 5. <u>4</u>  | 25. <u>3</u> |              |
| 6. <u>4</u>  | 26. <u>2</u> |              |
| 7. <u>4</u>  | 27. <u>3</u> |              |
| 8. <u>2</u>  | 28. <u>4</u> | 41. <u>4</u> |
| 9. <u>1</u>  | 29. <u>3</u> | 42. <u>2</u> |
| 10. <u>3</u> | 30. <u>3</u> | 43. <u>3</u> |
| 11. <u>2</u> | 31. <u>4</u> | 44. <u>3</u> |
| 12. <u>3</u> | 32. <u>1</u> | 45. <u>1</u> |
| 13. <u>2</u> | 33. <u>2</u> | 46. <u>1</u> |
| 14. <u>2</u> | 34. <u>1</u> | 47. <u>4</u> |
| 15. <u>1</u> | 35. <u>3</u> | 48. <u>1</u> |
| 16. <u>1</u> | 36. <u>2</u> | 49. <u>1</u> |
| 17. <u>3</u> | 37. <u>4</u> | 50. <u>1</u> |
| 18. <u>3</u> | 38. <u>2</u> |              |
| 19. <u>3</u> | 39. <u>4</u> |              |
| 20. <u>4</u> | 40. <u>1</u> |              |



**Answer Key**  
**Matter Review [Sep 12, 2011]**

1. 4

2. 2

3. 4

4. 3

5. 4

6. 4

7. 4

8. 2

9. 1

10. 3

11. 2

12. 3

13. 2

14. 2

15. 1

16. 1

17. 3

18. 3

19. 3

20. 4

21. 2

22. 2

23. 3

24. 2

25. 3

26. 2

27. 3

28. 4

29. 3

30. 3

31. 4

32. 1

33. 2

34. 1

35. 3

36. 2

37. 4

38. 2

39. 4

40. 1

41. 4

42. 2

43. 3

44. 3

45. 1

46. 1

47. 4

48. 1

49. 1

50. 1