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ISBN-13: 978-1466232624

ISBN-10: 1466232625

Printed in The United States of America

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Worksheets

Concept by Concept

Set A: Terms and definitions

Objective: *By defining these words, you will become more familiar with types of matter related terms and their definitions*

Define, neatly and clearly, types of matter related terms below.

1. Pure substance

2. Mixture

3. Element

4. Compound

5. Law of definite proportion

6. Homogeneous mixture

7. Heterogeneous mixture

8. Aqueous solution

9. Decantation

10. Filtration

11. Distillation

Set B: Facts related to matter

Objective: *To test your ability to describe and explain differences and similarities between the types of matter.*

Answer the following questions clearly and neatly.

12. What are the two types of pure substances?

13. What are the two classifications of mixtures?

14. Which methods are used to separate components of compounds?

15. Which methods are used to separate components of mixtures?

16. How are elements and compounds similar?

17. How are elements and compounds different?

18. How are compounds and mixtures similar?

19. How are compounds and mixtures different?

Set C: Classifying matter

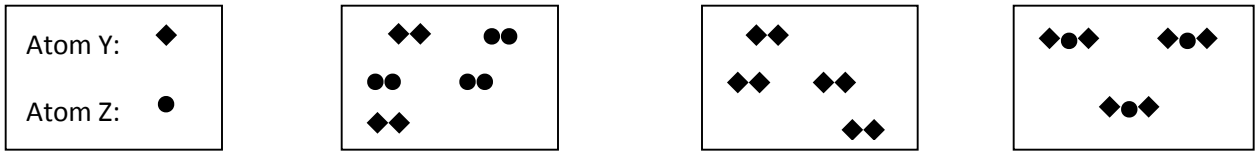
Objective: *To test your ability to classify different types of matter by symbols, names, and diagrams*

Classify each of the followings with the combination of terms listed below.

Pure substance – element
Pure substance – compound
Mixture – homogenous
Mixture – heterogeneous

20. HCl(aq) _____
21. KBr (s) _____
22. $Cl_2(g)$ _____
23. $CH_2(OH)_2$ aq) _____
24. Hg(l) _____
25. $NH_3(l)$ _____
26. Sugar _____
27. Soil _____
28. Water _____
29. Sodium _____
30. Iron oxide _____
31. Salt water _____

Classify each diagram as: pure substance–element or pure substance–compound or Mixture



Key

32. _____ _____
33. _____ _____
34. _____ _____

Set D: Drawing diagrams of matter:

Objective : *To test your ability to use symbols to draw diagrams to represent the different types of matter*

Symbols of two different atoms are given below.

Atom X: O Atom Y: Δ

In the boxes provided for number 35 to 37, draw diagrams to represent the different types of matter.

35. Diatomic element X
36. Compound X_2Y_2
37. A mixture of diatomic element Y and compound X_2Y

Draw at least five units | Draw at least five units | Draw at least five units

Set A: Terms and definitions

Objective: *By defining these words, you will become more familiar with phase, temperature and energy related terms and their definitions.*

Define the following phase, phase change, energy and temperature related terms. Be neat and clear.

1. Solid

2. Liquid

3. Gas

4. Fusion

5. Freezing

6. Condensation

7. Evaporation

8. Sublimation

9. Deposition

10. Exothermic

11. Endothermic

12. Temperature

13. Kinetic energy

14. Potential energy

15. Ice / liquid equilibrium

16. Water / steam equilibrium

17. Phase change diagram

18. Absolute Zero

Set B: Phases of matter and temperature:

Objective: *To test you knowledge of facts related to phases, phase changes, energy and temperature.*

Answer the following questions.

19. Which phase of matter have particles that are arranged in regular geometric?

20. In which phase of water can the molecules of water flow over each other?

21. How would you compare the forces of attraction between particles of a substance in the liquid phase to those in the gas phases?

22. Which three phase changes are endothermic?

23. Which three phase changes are exothermic?

24. How many reference temperature points are needed to create a thermometer scale?

25. Which temperatures are commonly used as reference points to create Celsius or Kelvin thermometer?

26. How is average kinetic energy of particles relates to temperature of a substance?

Set C: Relating phase change to energy

***Objective*:** *To test your ability to relate phase changes of matter to energy*

Above each arrow write the phase change (*fusion, condensation…etc*) that is represented by the equation.

Under each arrow, write "exothermic" or "endothermic" to indicate if the change releases or absorbs heat.

27. $Au(l)$ ---------- > $Au(s)$

28. $C_{10}H_8(s)$ ---------- > $C_{10}H_8(g)$

29. $NaCl(s)$ ---------- > $NaCl(l)$

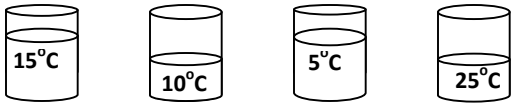
30. $C_2H_3O_2\ (g)$ ---------- > $C_2H_3O_2(l)$

Set D: Temperature

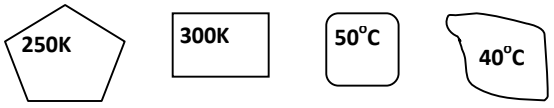
Objective: To test your understanding of temperature and kinetic energy.

*Write **"Highest KE"** under the container or object that has particles with highest kinetic energy.*
*Write **"Lowest KE"** under the container or object that has particles with lowest kinetic energy.*

31.



32.



Convert the given temperatures to Kelvin.

33. $-15^{o}C$

34. $30^{o}C$

35. $120^{o}C$

Convert the given temperatures to Celsius.

36. 27 K

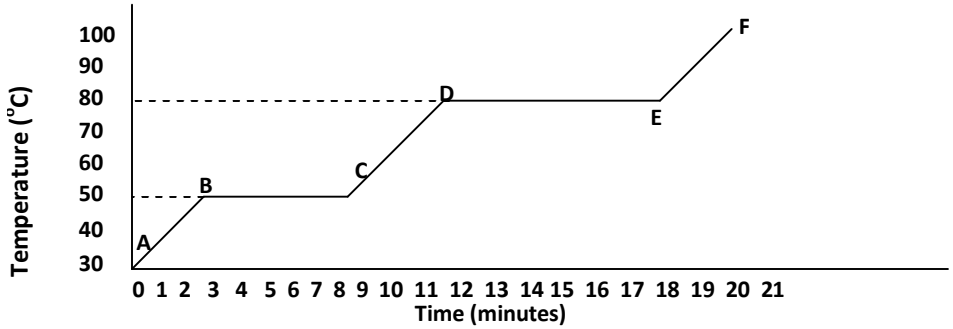
37. 125 K

38. 325 K

Set E: Phase change diagram

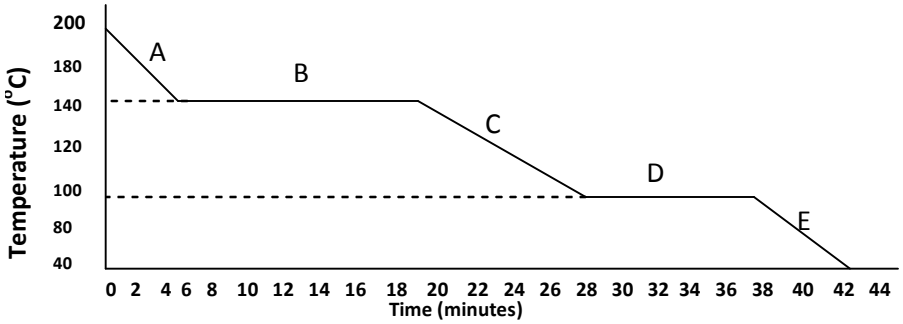
Objective: *To test your ability to interpreted phase change diagrams.*

The diagram below shows the heating of a substance starting with the substance below its melting point.



39. What is the boiling point of the substance?
40. At what temperature are the solid and liquid phases exist at equilibrium?
41. At which segment or segments is the substance average kinetic energy increasing?
42. At which segment or segments is the substance exists in two phases?
43. Potential energy of the substance remains constant during which segment or segments?
44. What is the total length of the time that the substance exists only as a liquid?
45. What is the total length of time that the substance undergoes fusion?
48. Is the diagram a heating curve of water or of a different substance? Explain your answer.

The diagram below shows the cooling of a substance starting with the substance at a temperature above it boiling point. The substance is losing heat at a rate of 155 Joules per minute.



49. What is boiling point of the substance?
50. What is the freezing point of the substance?
51. What is the melting point of the substance?
52. Which segment or segments represents a time when the substance is changing phase?
53. Which segment or segments represents a time when the substance is in one phase?
54. What is the phase or phases of the substance during segment C?
55. What is the total length of time it took for the substance to change from liquid to solid?
56. Describe the change in kinetic energy of the substance during segments A and segment B?
57. How much heat did the substance lose to completely change from gas to liquid?
58. How much heat did the substance lose to completely change from liquid to solid?

Set A: Terms and definitions

Objective: *By defining these words, you should become more familiar with heat related terms and their definitions.*

Define, neatly and clearly, the following heat related terms.

1. Heat

2. Joules

3. Specific heat capacity

4. Heat of fusion

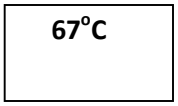
5. Heat of vaporization

6. Calorimeter

Set B: Direction of heat flow

Objective: *To test your ability to determine direction of heat flow between two objects.*

For each question below, draw an arrow (---heat ------- >) or (< ------heat----) between the two objects to show the direction that heat will flow between them.

7. 

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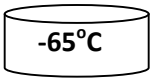
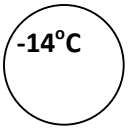
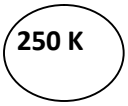
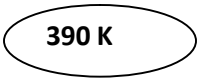
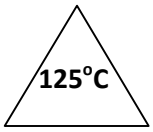


9. 



10. 



Set C. Heat calculation

Objective: *To test your ability to set-up and solve heat problems.*

For each question below: W*rite down heat equation to use, set up, and solve the heat problem.*

Show all work in the space to the right of the question.

11. How much heat is absorbed when a 10-g sample of water changes its temperature from 23°C to 32°C?

12. How much heat is released by a 15 gram sample of water to cool from 50°C to 46°C?

Set C continues

13. How much heat is released by 38 gram sample of water to freeze?

14. Calculate the number of joules of heat needed to change a 25 g sample of water to steam at its boiling point.

15. How much heat is absorbed by a 170 gram sample of ice to melt at $0^{o}C$?

16. The specific heat capacity of a substance is 15 J/g.^{o}C. How much heat would be released by a 25 g sample of this substance to cool from $100^{o}C$ to $90^{o}C$?

17. Substance Y has a heat of fusion of 3.5 KJ/g. How much heat would a 30 gram sample of substance Y absorbs to melt at its melting point?

18. Propane has a heat of vaporization of 356 Joules per gram. How much heat is needed to completely evaporate a 40 gram sample of propane at its boiling temperature of 230K?

19. If 5000 J is required to evaporate 36 grams of a liquid at constant temperature. What is the heat of vaporization of the liquid?

20. A student determined that a sample of water absorbed 2200 joules of heat when it changed its temperature from $47^{o}C$ to $59^{o}C$. What is the mass of the water sample?

21. A 5.7 g sample of copper absorbed 1023 J of heat to melt at its melting point. What is the heat of fusion of copper?

22. What is the specific heat capacity of an unknown substance if 10 grams of the substance absorbed 550 J of heat to change from $26^{o}C$ to $33^{o}C$?

Set A: Kinetic molecular theory

Objective: *To test your knowledge of facts related to the kinetic molecular theory of ideal gas.*

Read page 19 set 29 in the Guided Study Book. Fill in the missing word or phase in the blank spaces provided as you read.

Kinetic molecular theory of ideal gas.

1. Behavior of gases is influenced by which three factors: _____, _____ and _____
2. The kinetic molecular theory of ideal gas is used to explain _____ of gases.
3. Gas is composed of _____ particles.
4. Distances between gas particles are _____ . _____.
5. Gas particles are in _____, _____, _____ line motion
6. When two particles of gas _____, energy is _____from one particle to another.
7. Particles of gases have _____ _____ to each other.
8. Volume of individual gas particle is _____ .

Deviation from ideal gas model.

9. Name four real gases that you know.

10. Give two reasons why real gases do not behave exactly like ideal gas.

11. Under what two conditions do real gases behave most like an ideal gas?

12. Under what two conditions do real gases behave least like an ideal gas?

13. Which two real gases behave most like (deviate least from) an ideal gas?

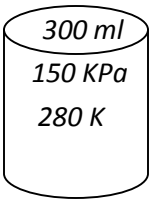
Set B: Avogadro's law

Objective: *To test your understanding of Avogadro's law*

14. According to Avogadro's law, under the same conditions of temperature and pressure;
Equal volume of gases will contain _____ _____ _____ _____.

15. Gas A in a container below has the following properties:

volume *300 ml*
pressure *150 KPa*
temperature *280 K*



Gas A

Circle a gas below that will contain the same number of gas molecules as Gas A in the container.

	volume	**pressure**	**temperature**
Gas B :	300 ml	280 KPa	150 K
Gas C :	300 ml	150 KPa	280 K
Gas D :	600 ml	300 KPa	560 K

Set C: Gas law calculations

Objective: *To test your ability to set-up and solve gas law problems*

For each question below, write down the factors given, set-up the problem using the combined gas law equation, and solve for the unknown factor.

16. At constant pressure, a 3.5 L sample of oxygen gas is at 280 K. If the temperature is increased to 560 K, calculate the new volume of the gas.

Determine factors from question. *Write down the gas law equation, set-up and solve*

P_1 = P_2 =

V_1 = V_2 =

T_1 = T_2 =

17. A 100 ml sample of a gas is at STP. What will be its new pressure if the volume is decreased to 50 ml and the temperature is increased to 480 K?

Determine factors from question. *Write down the gas law equation, set-up and solve*

P_1 = P_2 =

V_1 = V_2 =

T_1 = T_2 =

18. A gas at constant temperature has a volume of 2 L at 101.3 KPa. What will be the new volume if the pressure is increased to 303.9 KPa?

Determine factors from question. *Write down the gas law equation, set-up and solve*

P_1 = P_2 =

V_1 = V_2 =

T_1 = T_2 =

19. At constant volume, a gas at 300 K had its pressure changed from of 0.8 atm to 0.5 atm. What will be the new temperature of the gas?

Determine factors from question. *Write down the gas law equation, set-up and solve*

P_1 = P_2 =

V_1 = V_2 =

T_1 = T_2 =

20. A 0.8 L gas at STP had its temperature changed to 50^{o}C and its pressure changed to 80 KPa. What is the new volume of the gas?

Determine factors from question. *Write down the gas law equation, set-up and solve*

P_1 = P_2 =

V_1 = V_2 =

T_1 = T_2 =

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