KEY

Name: _____

Hour: _____

Physical Science Semester 2 Final Exam Review

CHAPTER 8 – Matter and Temperature

Matching: *Select the correct term to complete each sentence. There are extra terms in the list.*

Homogeneous	heterogeneous	pure substance	Fahrenheit
Mixture	evaporation	absolute zero	melting point
Solid	liquid	gas	boiling point
Celsius	more	less	

1. A certain brand of cough syrup contains caramel, citric acid, FD&C red #40, flavoring, glucose, glycerine, high fructose corn syrup, purified water, saccharin sodium and sodium benzoate. It is considered to be a mixture.
2. Matter that cannot be separated into other types of matter by physical means would be called a(n) pure substance.
3. A mixture in which different samples are not necessarily made up of exactly the same proportions of matter is a heterogeneous mixture.
4. A mixture that contains more than one type of matter and is the same throughout is a homogeneous mixture.
5. The temperature scale on which the freezing point of water is 32 degrees and boiling point of water is 212 degrees is the Fahrenheit scale.
6. The temperature at which molecules have their lowest possible energy is named absolute zero.
7. The phases of matter which flow are both liquid and gas.
8. The temperature at which a solid changes to a liquid is called the melting point.
9. The cooling process that changes a liquid to a gas is called boiling point.
10. Most materials are more dense in their solid phase than in their liquid phase.

11. Convert 27 degrees Celsius to Kelvin.

$$T_K = T_C + 273 \rightarrow T_K = 27°C + 273 = 300\,K$$

12. Convert 45 degrees Fahrenheit to degrees Celsius.

$$T_C = \frac{5}{9}(T_F - 32) = \frac{5}{9}(45 - 32) = 7.2°C$$

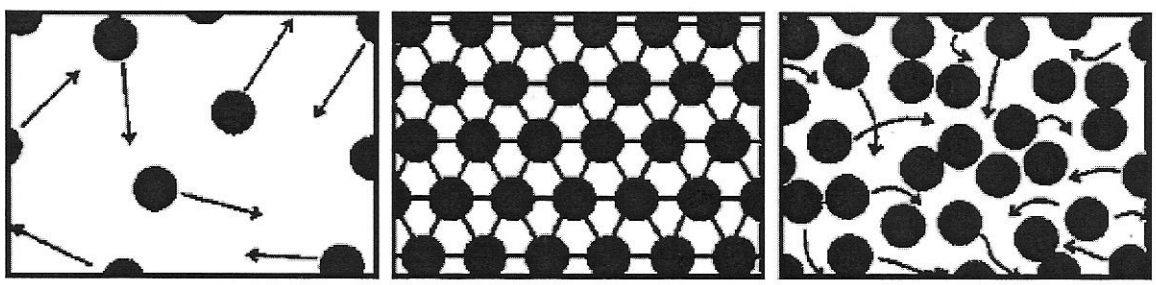


Figure 8-1:

13. Identify each phase in Figure 8-1.

A: gas, B: solid, C: liquid

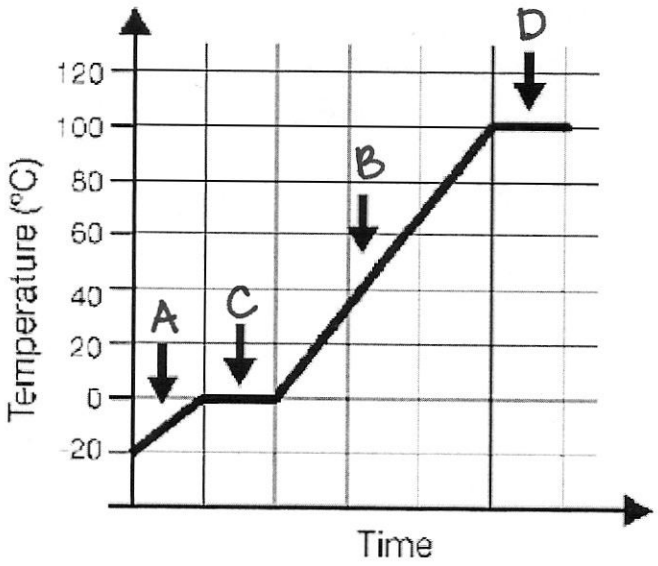
14. List the phases shown in Figure 8-1 in order of their temperatures from highest to lowest.

A(gas), C(liquid), B(solid)

15. List the strength of the intermolecular forces between molecules shown in Figure 8-1 in order of strongest to weakest.

B(solid), C(liquid), A(gas)

16. The graph below was drawn using data recorded as water at -20ºC was heated to 100ºC. On the graph, use letters A, B, C, and D to label the arrows pointing to those phases or combination of phases represented from the list.



A. Only ice is present
B. Only liquid water is present
C. Ice and water are present
D. Steam and water are present

CHAPTER 10 – Properties of Matter

17. In general, how do the densities of solids, liquids, and gases compare?

density of solid > density of liquid > density of gas

a. Explain why most substances follow this order.

molecules are closest together in solids

b. Give an example of a substance that does NOT follow this order.

water - the density of solid water (ice) is less than the density of liquid water

18. A density column was created using the liquids in the table below. Assuming the materials do not mix, in what order do the liquids appear from bottom to top? Give a brief explanation for why this arrangement occurs.

Liquid	Chemical Formula	Density (g/cm³) at T = 20°C
Ethyl alcohol	C_2H_5OH	0.791
Carbon tetrachloride	CCl_4	1.60
Gasoline		0.66-0.69
Mercury	Hg	13.6
Water	H_2O	0.998

mercury, carbon tetrachloride, water, ethyl alcohol, gasoline

Most dense liquid on bottom, least dense on top

19. What is the density of a block of aluminum with a mass of 312 grams and a volume of 116 cm^3?

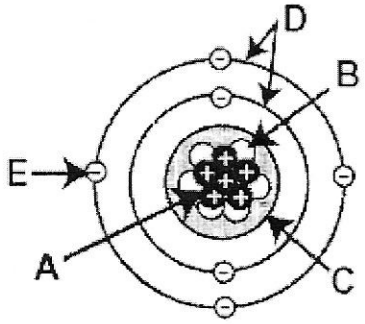
$$D = \frac{m}{V} = \frac{312\ g}{116\ cm^3} = 2.69\ g/cm^3$$

20. What is the mass of an iron horseshoe with a volume of 97.0 cm^3? The density of iron is 7.90 g/ cm^3.

$D = \frac{m}{V}$ so $m = DV = (7.90\ g/cm^3)(97.0\ cm^3) = 766\ g$

CHAPTER 12 – Atoms and the Periodic Table

Match each part of the atom with its identity from the list below.



21. D energy level
22. B neutron
23. A proton
24. E electrons
25. C nucleus

26. Label the information provided on the periodic table for oxygen:

8	atomic number
O	element symbol
Oxygen	element name
15.999	atomic mass

27. Atomic number = number of protons or number of electrons

28. Atomic mass = number of protons + number of neutrons

29. Complete the chart below:

	Element	Atomic Number	Atomic Mass	Protons	Neutrons	Electrons
a	Na	11	23	11	12	11
b	O	8	16	8	8	8
c	H	1	1	1	0	1
d	Ar	18	40	18	22	18
e	F	9	19	9	10	9

30. The atomic mass of magnesium is listed as 24.31 amu when magnesium has 3 stable isotopes: Mg^{24}, Mg^{25}, and Mg^{26}.
    a. Define "isotope": atoms of the same element that have different numbers of neutrons
    b. Describe which isotope of magnesium is most commonly found on Earth.
    Mg^{24} – the average atomic mass of 24.31 amu is a weighted average, so there must be more Mg^{24} than Mg^{25} and Mg^{26}

31. List 3 halogens:
    fluorine (F), chlorine (Cl), bromine (Br)

32. List 3 alkali metals: lithium (Li), sodium (Na), potassium (K)

33. List 3 noble gases: helium (He), neon (Ne), argon (Ar)

34. How are elements in the same group related to one another?
Elements have similar properties & same # of valence electrons

35. How are elements in the same period related to one another?
The properties of the elements gradually change as another electron is added with each element.

CHAPTER 13 – Compounds

36. Which electrons in atoms interact to form chemical bonds? valence

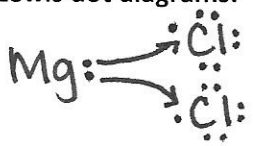
37. How many electrons can each level hold? First = 2 Second = 8 Third = 8

38. Complete the chart below:

	Element	Total Number of Electrons	Number of Valence Electrons	Lewis Dot Diagram	Will it lose or gain electrons?	Charge when electrons lost/gained
a	Fluorine	9	7	:F:	gain	-1
b	Sodium	11	1	Na·	lose	+1
c	Oxygen	8	6	:O:	gain	-2
d	Magnesium	12	2	Mg:	lose	+2
e	Chlorine	17	7	:Cl·	gain	-1
f	Neon	10	8	:Ne:	neither	neutral

39. Draw Lewis dot diagrams to show the ionic bonding that occurs between the following pairs of elements:

magnesium + chlorine
Lewis dot diagrams:

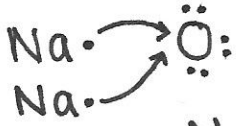


Chemical formula: $MgCl_2$

magnesium + oxygen
Lewis dot diagrams:

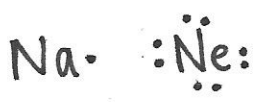
Chemical formula: MgO

sodium + oxygen
Lewis dot diagrams:



Chemical formula: Na_2O

sodium + neon
Lewis dot diagrams:



Chemical formula: no bond formed

CHAPTER 14 – Changes in Matter

Modified True/False: *Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.*

40. T An equation for a chemical reaction that correctly preserves the number and type of atoms on both sides of the reaction is considered *balanced*. _____
41. F A number in an equation which designates the number of molecules of a substance taking part in a chemical reaction is called a *subscript*. coefficient
42. F A substance formed in a chemical reaction is called a *reactant*. product
43. F A solid product that comes out of solution in a chemical reaction is called a *pollutant*. precipitate
44. T The term applied to a nucleus that does NOT spontaneously break up is *stable*. _____

45. List the 4 indicators of a chemical reaction:
    1. color change
    2. temp change
    3. bubbling (gas forming)
    4. turns cloudy (solid forming)

46. Balance the following equations:

    a. 1 CH_4 + 2 O_2 → 2 H_2O + 1 CO_2

    b. 1 CH_4 + 4 Cl_2 → 4 HCl + 1 CCl_4

    c. 2 $AgNO_3$ + 1 $CuCl_2$ → 2 AgCl + 1 $Cu(NO_3)_2$

47. Identify the types of reactions below:
    a. $C_{10}H_8 + 12\ O_2 \text{ ---> } 10\ CO_2 + 4\ H_2O$ combustion
    b. $2\ H_2O \text{ ---> } 2\ H_2 + O_2$ decomposition
    c. $Pb(NO_3)_2 + 2\ KI \text{ ---> } PbI_2 + 2\ KNO_3$ double displacement
    d. $8\ Fe + S_8 \text{ ---> } 8\ FeS$ synthesis
    e. $Cl_2 + 2KI \text{ ---> } 2KCl + I_2$ single displacement

48. a. What is the definition of an endothermic reaction?
    a chemical reaction that uses more energy than it releases

    b. What is the definition of an exothermic reaction?
    a chemical reaction that releases more energy than it uses

    c. Is the reaction below endothermic or exothermic? Explain how you know.

    $NH_4NO_3(s) + H_2O(l) + \text{energy} \rightarrow NH_4^+(aq) + NO_3^-(aq) + H_2O(l)$

    endothermic - more energy is put into the reaction than is given off

49. What is the difference between nuclear fission and nuclear fusion?
    Nuclear fission is the process of splitting the nucleus of an atom. Nuclear fusion is the process of combining the nuclei of atoms.

CHAPTER 16 - Electricity

Matching: *Select the correct term to complete each sentence. There are extra terms in the list.*

Semiconductor	resistor	superconductor
current	voltage	chemical
positive	negative	neutral
ammeter	circuit	static
increase	decrease	circuit breaker

50. Electricity flows through a complete path called a(n) circuit.
51. An object that has equal amounts of positive and negative charge is considered to be electrically neutral.
52. The tiny imbalance of charge that develops on your body as you scuff your feet along a carpet is called static electricity.
53. Charge is caused to flow by the difference in the voltage between two points in circuit.
54. A battery transforms chemical energy into electrical energy to move charges.
55. Devices that can be used to measure current in a circuit include the multimeter and the ammeter.
56. Fuses protect a circuit from too much current by creating a break in the circuit but must be replaced. A device that may be reset while providing the same protection is a(n) circuit breaker.
57. Materials through which charge flows with no loss of energy as heat or light are called superconductors
58. According to Ohm's law, resistance is the ratio of voltage to current. $R = \frac{V}{I}$
59. ~~As more resistors are added in parallel, the total circuit resistance~~ _____.

60. You install two batteries in a flashlight so that their positive ends are connected together. Will the flashlight work? Why or why not?
The flashlight will not work because the voltage difference across the flashlight is zero.

61. Give two examples for each of the following: a conductor, an insulator and a semiconductor.
conductor: copper, iron
semiconductor: carbon, silicon
insulator: wood, rubber
62. Describe a resistor and its function in a circuit.
A resistor is an electrical device that controls the current carried in a circuit.

63. According to Ohm's Law, how are current and voltage related?
Current and voltage are directly related - increasing the voltage will increase the current
64. According to Ohm's Law, how are current and resistance related?
Current and resistance are inversely related - increasing the resistance will decrease the current
65. A miniature light bulb with a resistance of 3 ohms is connected to a 6-volt source. How much current will flow through the bulb?
$I = \frac{V}{R} = \frac{6 \text{ Volts}}{3 \text{ ohms}} = 2 \text{ amps}$
66. Typically, household appliances operate at 120 volts. What is the resistance of a microwave if 4 amps of current flow in the circuit of a microwave?
$I = \frac{V}{R}$ so $R = \frac{V}{I} = \frac{120 \text{ volts}}{4 \text{ amps}} = 30 \text{ ohms}$

CHAPTER 17 – Magnetism

Modified True/False: *Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.*

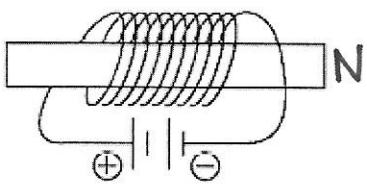
67. F The difference between true north and the direction a compass needle points is called magnetic *inspiration*. declination
68. F The type of magnet created when a coil of wire carries an electric current is called a *permanent magnet*. electromagnet
69. F The device that switches the direction of the electric current in the electromagnet of an electric motor is called the *rotor*. commutator
70. F An electric *generator* changes electrical energy to mechanical energy. motor

Matching: *Select the correct term to complete each sentence. There are extra terms in the list.*

alternating	direct	permanent magnet	electric
generator	electromagnet	magnetic	electromagnetic induction motor
north	positive	renewable	south
negative	nonrenewable	positive	magnetic field

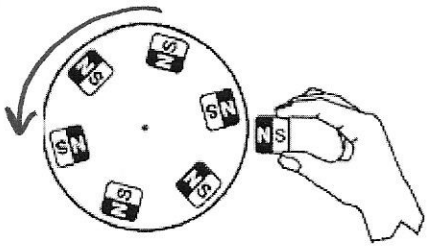
71. The influence created by a magnet that exerts forces on other magnets and magnetic material is called a(n) magnetic field.
72. A device that keeps its magnetic properties even when it is not close to other magnets is known as a(n) permanent magnet
73. A material that is attracted to a magnet, but never repelled, is described as magnetic.
74. The opposite ends of a magnet are identified as north and south poles.
75. A device that changes mechanical energy to electrical energy is a(n) generator.
76. The process of using a moving magnet to create an electric current is called electromagnetic induction.
77. A natural resource that is not replaced as it is used is called a(n) nonrenewable resource.

78. Which end of the electromagnet pictured below would be labeled north pole or "N"? Explain your answer.



The current leaves the ⊕ side travels around the front of the magnet. Wrap the fingers of your right hand around the magnet in the direction of the current. Your thumb points towards the north pole.

79. In which direction will the rotating disk below spin? Explain your answer.



Counter-clockwise

The north pole of the magnet in the hand will repel the north pole of the magnet on the rotor, pushing the rotor away in a counter-clockwise direction.

80. Describe how to induce current to flow in a coil of wire.

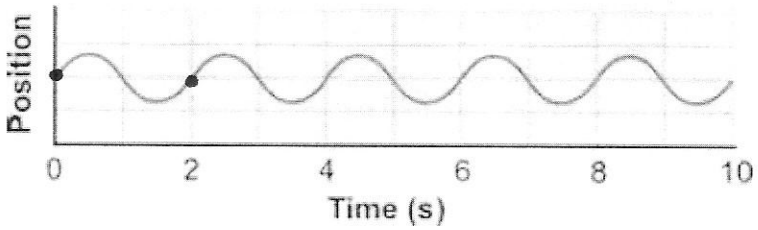
- Move a magnet inside a coil of wire.
- Move a coil of wire around a magnet.

81. Define frequency: the number of cycles in 1 second

82. Define period: the time needed to complete 1 cycle

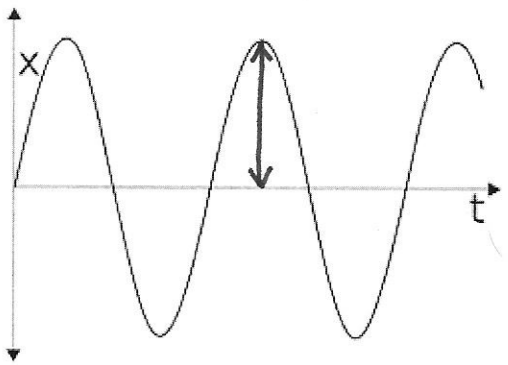
83. An object with repeating cycles of motion is a(n) oscillator.
84. One unit of harmonic motion is called a(n) cycle.
85. The maximum distance an oscillator moves from its equilibrium position is called its amplitude.

86. What is the period of the oscillation shown below? 2 seconds



87. State whether the following are linear or harmonic motions.
    a. skiing downhill - linear
    b. riding on a merry-go-round - harmonic
    c. hiking uphill - linear
    d. jumping on a trampoline - harmonic

88. Draw an arrow on the diagram below that shows the amplitude of the wave.



89. What will happen to the period of a pendulum if you:
    a. Increase its mass? - nothing
    b. Increase its length? – period will increase
    c. Increase the amplitude? - nothing

90. A swing has a period of 7 seconds. What is its frequency?

$$f = \frac{1}{T} = \frac{1}{7\,sec} = 0.14\ Hz$$

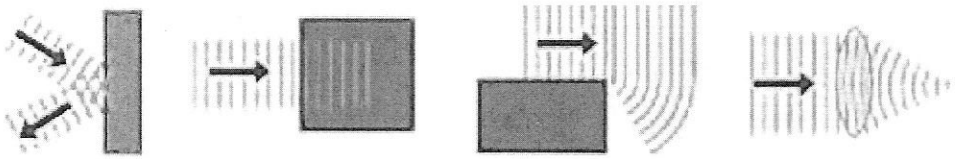
91. An oscillator makes 8 vibrations in 1 second. What is its period and frequency?

f = 8 Hz (8 vibrations in 1 second)
T = 1/f = 1/8 Hz = 0.125 s

92. A wave has a frequency of 5 hertz and a wavelength of 6 meters. Calculate the speed of the wave.

$v = f\lambda$
$= 5\ Hz\ (6\ m)$
$= 30\ m/s$

93. Below are diagrams representing interactions between waves and boundaries. Identify each interaction by name.



A reflection B absorption C diffraction D refraction

94. Read the descriptions below and indicate which of the four types of wave interactions (*absorption, reflection, refraction,* or *diffraction*) has occurred for each.

a. The distortion of your partially submerged arm makes it look "broken" when viewed from the air. refraction

b. You hear the music even though you are seated behind an obstruction at a concert. diffraction

c. You see yourself when you look at a polished car hood. reflection

d. Heavy curtains are used to help keep a room quiet. absorption