**NOTE – KEY DOES NOT MATCH YOUR STUDY GUIDE IDENTICALLY!!!**

**Final Exam Review Chapter 1 and 2**

1a. ? kg = 5250 cg . g . kg = **0.0525 kg**

 100 cg 1000 g

b. ?kg = 540 g . kg . 1000 cm3 = **540 kg/L**

 L cm3 1000 g L

2. ?cm3 = 26.3 g . cm3 = **3.34 cm3**

 7.87 g

3. ? gal = 215 lbs . 454 g . cm3 . L . 1.06 qt . gal = **2.64 gal**

 lb 9.80 g 1000 cm3  L 4 qt

4a. **4** b. **2** c. **1** d. **infinite** 5a. **100.5 g** b. **24.9 cm** c. **2.1.10-23 mm**

6a. chemical

b. physical, intensive

c. physical, intensive

d. physical, extensive

e. chemical

f. physical, extensive

g. physical, extensive

h. physical, intensive

i. physical, intensive 7. a. chemical b. physical c. physical d. chemical

j. chemical e. physical f. chemical g. physical

8. e 9. g 10. c 11. h 12. f 13. a 14. d 15. j 16. k 17. b

18. 1. Energy: (Light or Heat)

2. Gas: (Bubbles or Odor)

3. Formation of Precipitate (solid)
4. Color Change

19. 10 kg 20.1 ML 21. 1 km 22. 1 g/cm3 (same as 8.3 lb/gal) see below

?lb = 1.0 g . lb . 1000 cm3 . 1.00 L . 4 qt = 8.3 lb/gal

gal cm3 454 g L 1.06 qt gal

23. b 24. d 25. a 26. c

27a. homogeneous mixture b. compound

 c. element d. heterogeneous mixture

28 a. second, s b. mole, mol c. Kelvin, K

 d. decimeter cubed, dm3 e. kilogram, kg

29. The matter on the left is 1 type of atom so it is an element, further the element has a definite shape and volume so it is in the solid state.

 The matter on the right is a heterogeneous mixture of an element and a compound.

The element has a definite shape and volume so it is a solid and the compound is assuming the

shape of the container while having a definite volume so it is a liquid.

**Final Exam Review Chapters 3 and 4**

1a. 35 p+; 45 no; 36e- b. 12 p+; 12 no; 10e- c. 6p+; 6 no; 6e-

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2a. 1s22s22p63s23p64s1 K oxidation # (+1)

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 b. 1s22s22p63s23p1 Al oxidation # (+3)

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 c. 1s2 2s22p4 O oxidation # (-2)

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 d. 1s22s22p63s23p64s23d104p65s24d105p66s2 Ba oxidation # (+2)

3. Avg mass = (92.21 (27.977 amu) + 4.70 (28.976 amu) + 3.09 (29.974 amu))

 100

 Avg mass = **28.09 amu**

4. b,f 5. c 6. d 7. e 8. a, g

9.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| sublevel | s | p | d | f |
| # of orbitals in sublevel | 1 | 3 | 5 | 7 |
| # of e- per sublevel | 2 | 6 | 10 | 14 |
| Main energy level starts at | 1 | 2 | 3 | 4 |

10. an emission spectrum is caused from electrons being excited by some energy source. The electrons will then relax into lower energy levels. When the electrons transition from higher to lower energy levels, light is released

11. An atom (smallest part of an element that retains the element’s properties) is composed of a nucleus which contains protons and neutrons. Electrons move in orbitals outside of the nucleus in differing energy levels. For an atom there are equal numbers of protons and electrons.

 An ion is an atom that has lost or gained electrons.

 Isotopes of an element contain equal numbers of protons but differ in the numbers of neutrons that they contain.

12. mass number of an electron is 0, its charge is -1

 mass number of a proton is 1 and its charge is +1

 mass number of a neutron is 1 and its charge is 0

13. a. inversely proportional b. directly proportional c. inversely proportional

14. You don’t need to do frequency or Energy calculations on the final.

15. 1. All elements are composed of tiny particles called atoms.

2. Atoms of the same element are identical **(not true-isotopes).** The atoms of one element are *different* than those of another element.

 3. Atoms cannot be subdivided created or destroyed **(not true-subatomic particles)**

4. Atoms of different elements can combine with one another in whole ratios by

mass. This is called the **Law of Definite Proportions.** An example of the Law of Definite Proportions: The ratio of the mass of Sodium to Chlorine in Sodium Chloride is always 22.990g/35.453 g. This ratio holds regardless of the size of the sample.

5. Chemical reactions occur when atoms are separated, joined, or rearranged.

However, the atoms of an element are not changed into atoms of another element by the chemical reaction.

 **Law of Multiple Proportions** (this was *not* based upon experimental evidence,

but upon the other points of Dalton’s atomic theory). Whenever 2 elements form more than 1 compound, the ratio of mass of an element present in each compound, for a given mass the other element present in each compound, is in a ratio of small whole numbers.

**16.** Cs - #55

↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑↓ ↑

1s 2s 2p 3s 3p 4s **3d**  4p 5s 4d 5p 6s

Cesium follows the **Aufbau Principle** where *electrons fill in orbitals of lowest energy first (1s fills in*

*before 2s which fills in before 2p.)*.

Further it obeys **Hund’s Rule** where **e**lectrons fill in degenerate orbitals (*orbitals of the same energy*

*that are in the same sublevel and energy leve*l) *one at a time* with *parallel* spin *until each* degenerate

orbital *contains 1* *electron with parallel spin*, after that electrons can pair within the degenerate orbitals.

Cesium also follows the **Pauli Exclusion Principle** because it has *no 2 electrons can have the same set*

*of 4 quantum numbers* (you don’t observe any orbitals in the same orbital with the same spin).

**Final Exam Review Chapters 5, 6& 7**

# 1. How is the modern periodic table arranged differently than the way Mendeleev arranged it?

The modern periodic table has elements arranged by increasing atomic number (number of protons). Protons had not yet been discovered in the days of Mendeleev. He had the periodic table arranged by increasing mass. Which usually works, but there are a few elements out of place, such as zinc and copper.

For 2-17, identify as metal, nonmetal, or metalloid.

2a. Li b. Al c. He d. B e. Co f. Xe g. O2

metal metal nonmetal metalloid metal nonmetal nonmetal

3. Generally, shiny solids at room temperature metals

4. Brittle solids or gases at room temperature nonmetals

5. malleable and ductile metals

6. insulators nonmetals

7. tend to gain electrons nonmetals

8. tend to lose electrons metals

9. generally located along the stair-step metalloid

10. located on the right side of the periodic table nonmetals

11. located on the left side of the periodic table metals

12. Group ion charge number of valence electrons group/family names

 IA +1 1 alkali metals

 IIA +2 2 alkanline earth metals

 IIIB-IIB variable most have 2

 *(Ag = +1; Cd and Zn = + 2)* groups VI B and IB have 1 transition metals

 s1d5 s1d10

 IIIA +3 3 IIIA or boron group

 IV A variable 4 IVA or carbon group

 VA -3 5 VA or nitrogen group

 VIA -2 6 chalcogens

 VIIA -1 7 halogens

 VIIIA 0 8 noble gases

13. d 14. g 15. c 16. e 17. b 18. h 19. a 20a. K Ba Cl-1  b. Cl c. Fd. Ti

21. Ionic bonds are the result of electrons transferring from the metal (to form a cation) to the nonmetal

 (to form the anion). Covalent bonds are the result of electrons being shared between atoms of

 nonmetallic or metalloid elements.

22. covalent bonding

23. f 24. c 25. b 26. a (conductive in molten state) 27. d 28. e 29. h 30. i 31. g,i

32. Single bonds are longer and weaker than double bonds; double bonds are longer and weaker than triple bonds. Or could be stated

Triple bonds are shorter and stronger than double bonds; double bonds are shorter and stronger than single bonds.

33. stronger

..

δ- δ+

δ+ δ-

..

..

..

34a. H b. H-O-H c. O=C=O d. H-N-H

..

δ- δ+

δ- δ+

δ+ δ-

δ+ δ-

δ- δ+

..

..

 | |

δ+ δ-

δ- δ+

 H-C-H bent; 104.5o linear; 180o H

δ + δ-

δ- δ+

 | polar nonpolar trigonal pyramidal; 107.5o

 H London (dispersion); London (dispersion) polar

tetrahedral; 109.5o Hydrogen bonding London (dispersion); Hydrogen bonding

nonpolar

London

(dispersion)

**Final Exam Review Chapter 9 & 10 Review Answers**

1. ? mol SO3 = 83.55 g SO3 . 1 mol SO3 = **1.044 mol SO3**

**/**

**/**

80.063 g SO3

(32.066 + 3(15.999 ))g/mol = 80.063 g

2. ? molecules CO = 1.55x10-3 moles CO 6.02x1023 molecules CO = **9.33x1020molecules CO**
 1 mole CO

**/**

3. ? g Mn(ClO)2 = 0.2577 mol Mn(ClO)2 . 157.842 g Mn(ClO)2 = **40.68 g**

**/**

 1 mol Mn(ClO)2

 (54.938 + 2 (35.453) + 2 (15.999)) g/mol = 157.842 g/mol Mn(ClO)2

4.

**/**

**/**

?g C = 5.88.1027 atoms C mol C 12.011 g C = **1.17.105 g C**

**/**

**/**

 6.02.1023 atoms C mol C

5. ? moles = 3.6x1024 atoms Al 1 mole Al = **6.0 moles Al**
 6.02x1023 atoms Al

6. ? for. u. = 53.4g KBr 1 mole KBr 6.02x1023 for. u. = 2.70 x1023 for. u. KBr
 119.002 g KBr 1 mole KBr

7. % O = g O . 100

 g SO3

 % O = 3(15.999) g/mol . 100

 80.063 g/mol

 % O = **59.95%**

**/**

8. ? mol C = 6.0 g C mol C = 0.4995 mol C / 0.4995 mol = 1.00

**/**

 12.011 g C **CH3**

**/**

 ? mol H = 1.5 g H mol H = 1.488 mol H / 0.4995 mol = 3.00

**/**

 1.008 g H

9. 30.1 g/mol = 2.00 **C2H6**

 15.035 g/mol

 (12.011 + 3(1.008)) g/mol = 15.035 g/mol

**Answers to Naming Review**

1 a. hydrochloric acid 2 a. Ca3N2

 b. ammonium chloride b. Sr(MnO4)2

 c. silver hypochlorite c. HIO3 (aq)

 d. magnesium sulfite d. HI (aq)

 e. diphosphorous heptoxide e. Fe3(PO4)2

 f. calcium perchlorate f. Ba3N2

 g. oxalic acid g. P2O7

 h. stock: iron (II) carbonate classical: ferrous carbonate h. HClO4 (aq)

 i. dichromic acid i. Co(ClO)2

 j. nitric acid j. H3PO3 (aq)

 k. stock: copper (I) nitrite classical: cuprous nitrite k. Cu3(PO4)2

 l. sulfurous acid l. SnCl2

 m. dinitrogen tetroxide m. P4O10

 n. hypochlorous acid n. HCN (aq)

 o. sulfate ion o. NO3-1