



Chemistry 101

Midterm review

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Chapter 2

mass #
 $\rightarrow \#P + \# \text{neu.}$

4- Which atom has the smallest number of neutrons?

- 6 A) carbon-14 = 8
 7 B) nitrogen-14 = 7
 8 C) oxygen-16 = 8
 9 D) fluorine-19 = 10
 10 E) neon-20 = 10

$\#P = \#e^-$
 atomic number

PERIODIC TABLE

Atomic Number — 1 — Symbol
 Name — Hydrogen — Atomic Weight
 1.00794

Group →
 ↓ Period

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

1 H He
 2 Li Be B C N O F Ne
 3 Na Mg Al Si P S Cl Ar
 4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
 5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe
 6 Cs Ba * Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
 7 Fr Ra ** Rf Db Sg Bh Hs Mt Ds Rg Cn Nh Fl Mc Lv Ts Og

• Lanthanides
 • Actinides

Alkali metals Alkaline earth metals Transition metals Post-transition metals Other nonmetals Metalloids Halogens Noble gases Lanthanides Actinides

atomic number

PERIODIC TABLE

Group → 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 ← Group
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2 He Helium 4.002602

3 Li Lithium 6.941

4 Be Beryllium 9.012182

5 B Boron 10.811

6 C Carbon 12.0107

7 N Nitrogen 14.00642

8 O Oxygen 15.9994

9 F Fluorine 18.9984032

10 Ne Neon 20.1797

11 Na Sodium 22.98976928

12 Mg Magnesium 24.304

13 Al Aluminium 26.9815386

14 Si Silicon 28.08558

15 P Phosphorus 30.973762

16 S Sulphur 32.06

17 Cl Chlorine 35.453

18 Ar Argon 39.948

19 K Potassium 39.0983

20 Ca Calcium 40.078

21 Sc Scandium 44.955912

22 Ti Titanium 47.88

23 V Vanadium 50.9415

24 Cr Chromium 51.9961

25 Mn Manganese 54.938045

26 Fe Iron 55.845

27 Co Cobalt 58.933195

28 Ni Nickel 58.6934

29 Cu Copper 63.546

30 Zn Zinc 65.38

31 Ga Gallium 69.723

32 Ge Germanium 72.630

33 As Arsenic 74.9216

34 Se Selenium 78.96

35 Br Bromine 79.904

36 Kr Krypton 83.798

37 Rb Rubidium 85.4678

38 Sr Strontium 87.62

39 Y Yttrium 88.90585

40 Zr Zirconium 91.224

41 Nb Niobium 92.90638

42 Mo Molybdenum 95.94

43 Tc Technetium [98]

44 Ru Ruthenium 101.07

45 Rh Rhodium 102.9055

46 Pd Palladium 106.42

47 Ag Silver 107.8682

48 Cd Cadmium 112.411

49 In Indium 114.818

50 Sn Tin 118.71

51 Sb Antimony 121.757

52 Te Tellurium 127.6

53 I Iodine 126.90447

54 Xe Xenon 131.29

55 Cs Cesium 132.9054519

56 Ba Barium 137.327

57 La Lanthanum 138.90547

58 Ce Cerium 140.127

59 Pr Praseodymium 140.90768

60 Nd Neodymium 144.242

61 Pm Promethium [145]

62 Sm Samarium 150.36

63 Eu Europium 151.964

64 Gd Gadolinium 157.25

65 Tb Terbium 158.92532

66 Dy Dysprosium 162.5

67 Ho Holmium 164.930329

68 Er Erbium 167.259

69 Tm Thulium 168.934

70 Yb Ytterbium 173.054

71 Lu Lutetium 174.967

72 Hf Hafnium 178.49

73 Ta Tantalum 180.94788

74 W Tungsten 183.84

75 Re Rhenium 186.207

76 Os Osmium 190.23

77 Ir Iridium 192.222

78 Pt Platinum 195.084

79 Au Gold 196.966569

80 Hg Mercury 200.59

81 Tl Thallium 204.3833

82 Pb Lead 207.2

83 Bi Bismuth 208.9804

84 Po Polonium [209]

85 At Astatine [210]

86 Rn Radon [222]

87 Fr Francium [223]

88 Ra Radium [226]

89 Ac Actinium [227]

90 Th Thorium 232.0377

91 Pa Protactinium 231.03688

92 U Uranium 238.02891

93 Np Neptunium [237]

94 Pu Plutonium [244]

95 Am Americium [243]

96 Cm Curium [247]

97 Bk Berkelium [247]

98 Cf Californium [251]

99 Es Einsteinium [252]

100 Fm Fermium [257]

101 Md Mendelevium [258]

102 No Nobelium [259]

103 Lr Lawrencium [260]

104 Rf Rutherfordium [261]

105 Db Dubnium [262]

106 Sg Seaborgium [266]

107 Bh Bohrium [264]

108 Hs Hassium [277]

109 Mt Meitnerium [268]

110 Ds Darmstadtium [271]

111 Rg Roentgenium [272]

112 Cn Copernicium [285]

113 Nh Nihonium [284]

114 Fl Flerovium [289]

115 Mc Moscovium [288]

116 Lv Livermorium [293]

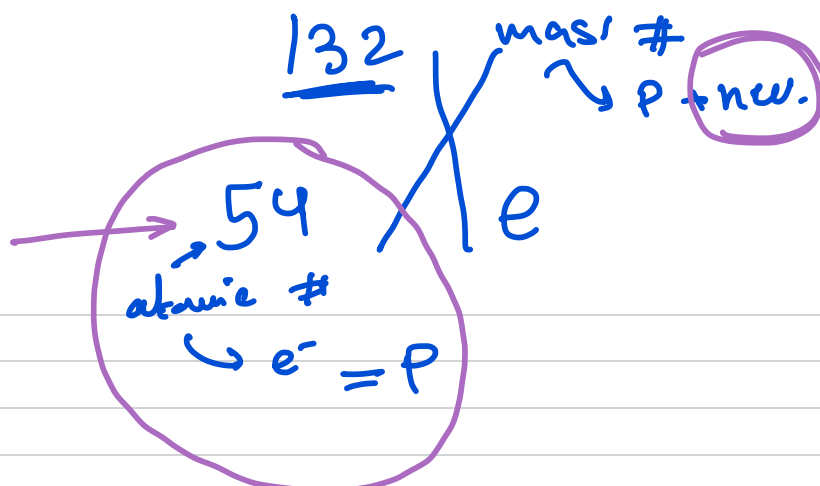
117 Ts Tennessine [294]

118 Og Oganesson [294]

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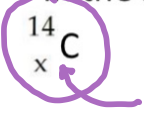
5- There are _____ electrons, _____ protons, and _____ neutrons in an atom of $^{132}_{54}\text{Xe}$.

- A) 132, 132, 54
B) 54, 54, 132 ?
C) 78, 78, 54
D) 54, 54, 78 ?
E) 78, 78, 132



$$\text{neu \#} = \text{mass \#} - \text{atomic \#} = 132 - 54 = 78$$

In the symbol shown below, x = _____.



The Periodic Table of the Elements

- A) 7
- B) 13
- C) 12
- ~~D) 6~~
- E) not enough information to determine

8- The element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{221}X	74.22	220.9
^{220}X	12.78	220.0
^{218}X	13.00	218.1

- A) 219.7
- B) 220.4
- C) 220.42
- D) 218.5
- E) 221.0

$$\begin{aligned} \frac{74.22}{100} \times 220.9 &= 163.95 \\ \frac{12.78}{100} \times 220.0 &= 28.116 \\ \frac{13.00}{100} \times 218.1 &= 28.353 \\ \hline &\approx 220.419 \end{aligned}$$

10- Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?

- ~~A) O, S~~
- B) C, N
- C) K, Ca
- ~~D) H, He~~
- E) Si, P



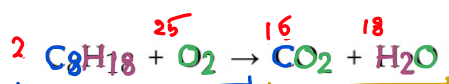
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Chapter 3



1- When the following equation is balanced, the coefficients are _____.



~~A) 2, 3, 4, 4~~

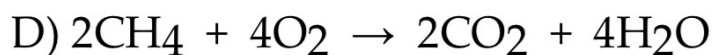
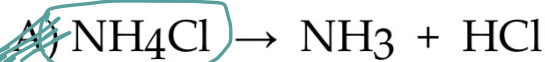
~~B) 1, 4, 8, 9~~

~~C) 2, 12, 8, 9~~

~~D) 4, 4, 32, 36~~

E) 2, 25, 16, 18

2- Of the reactions below, which one is a decomposition reaction?



→ Only one

Compound

as a reactant



فقط مركب واحد في السهم
سهم التفاعل ← النواتج أكثر

من واحد -

4- Calculate the percentage by mass of oxygen in $\text{Pb}(\text{NO}_3)_2$.

A) 9.7

B) 14.5

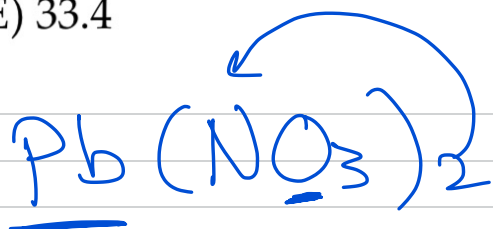
C) 19.3

D) 29.0

E) 33.4

7 N Nitrogen 14.00674	8 O Oxygen 15.9994
15 P Phosphorus 30.973761	16 S Sulfur 32.066

16



$$\% \text{ Oxygen} = \frac{\text{mass element} \times 100}{\text{total mass}}$$

$$\text{Mwt oxygen} = 6 \times 16 = \underline{96}$$

$$\text{Mwt}_{\text{total}} = [(1 \times 207.2) + (2 \times 14) + (6 \times 16)] =$$

$$= 207.2 + 28 + 96 = 331 \text{ g/mol}$$

$$\% = \frac{96}{331} \times 100 = 29.0$$

6- How many molecules of CH_4 are in 48.2 g of this compound?

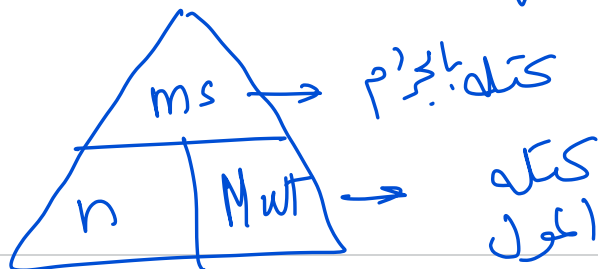
A) 5.00×10^{24}

B) 3.00

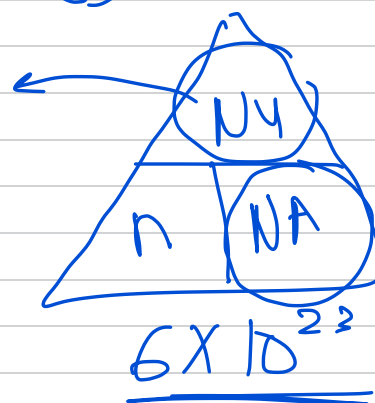
C) 2.90×10^{25}

~~D) 1.81×10^{24}~~

E) 4.00



$$n = \frac{ms}{Mwt} = \frac{Nu}{NA}$$



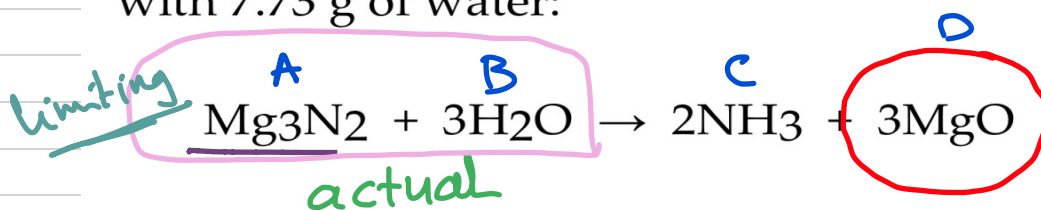
$$Nu = \frac{ms \times NA}{Mwt}$$

$$= \frac{ms \times 6 \times 10^{23}}{Mwt}$$

$$Mwt = (1 \times 12) + (4 \times 1) = \frac{12 + 4 = 16}{\text{g/mole}}$$

$$Nu = \frac{48.2 \times 6 \times 10^{23}}{16} = 18.075 \times 10^{23}$$

15- A 3.82-g sample of magnesium nitride is reacted with 7.73 g of water:



The yield of MgO is 3.60 g. What is the percent yield in the reaction?

A) 94.5

B) 78.4

C) 46.6

D) 49.4

E) 99.9

$$\text{Mg} = 24.3$$

$$\text{N} = 14$$

$$\text{H} = 1$$

$$\text{O} = 16$$

يعطى في السؤال

$$\% \text{ Yield} = \frac{\text{actual}}{\text{theo.}} \times 100$$

→ theo. ← ^{مجهول}
 ← ^{الطاب يحسبه}

$$\frac{n(A)}{a} = \frac{n(B)}{b} = \frac{n(C)}{c} = \frac{n(D)}{d}$$

$$\frac{ms}{M_{wt}} = \frac{3.82}{100.9} = 0.037 \text{ moles}$$

$$\frac{ms}{M_{wt}} = \frac{7.73}{18} = 0.429 \text{ moles}$$

$$\frac{n(A)}{1} = \frac{n(\text{MgO})}{3}$$

$$\therefore n(\text{MgO}) = 3 \times 0.037 = 0.111 \text{ moles}$$

$$n = \frac{ms}{M_{wt}} \therefore ms = n \times M_{wt}$$

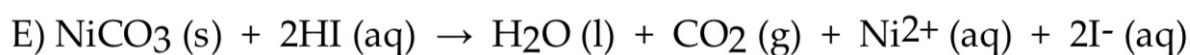
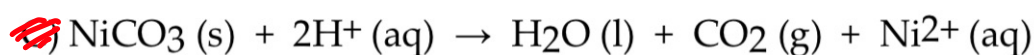
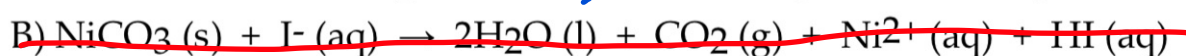
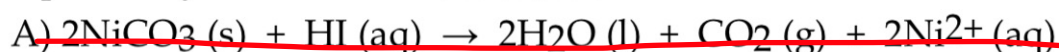
$$ms = 0.111 \times 40.3 = 4.4733 \text{ g}$$

$$\% \text{ yield} = \frac{3.6}{4.4733} \times 100 = 80.11$$

Chapter 4



1- The net ionic equation for formation of an aqueous solution of NiI_2 accompanied by evolution of CO_2 gas via mixing solid NiCO_3 and aqueous hydriodic acid is _____.



spectator ions

