

Chem. 110, Exam. 1

Time : 90 min

2010 Summer Semester

**Model (B)**

|  |
| --- |
| Name: Number: Section: |
| **Useful information:**  Avogadro’s No., Nav = 6.022×1023 mol1 |

PERIODIC TABLE

Symbol

(268)

**Mt**

Meitnerium

109

(265)

**Hs**

Hassium

108

(264)

**Bh**

Bohrium

107

(266)

**Sg**

Seaborgium

106

(262)

**Db**

Dubnium

105

(261)

**Rf**

Rutherfordium

104

(227)

**Ac**

Actinium

89

(226)

**Ra**

Radium

88

(223)

**Fr**

Francium

87

(222)

**Rn**

Radon

86

(210)

**At**

Astatine

85

(210)

**Po**

Polonium

84

209

**Bi**

Bismuth

83

207

**Pb**

Lead

82

204

**Tl**

Thallium

81

201

**Hg**

Mercury

80

197

**Au**

Gold

79

195

**Pt**

Platinum

78

192

**Ir**

Iridium

77

190

**Os**

Osmium

76

186

**Re**

Rhenium

75

184

**W**

Tungsten

74

181

**Ta**

Tantalum

73

178.5

**Hf**

Hafnium

72

139

**La**

Lanthanum

57

137

**Ba**

Barium

56

133

**Cs**

Cesium

55

131

**Xe**

Xenon

54

127

**I**

Iodine

53

128

**Te**

Tellurium

52

122

**Sb**

Antimony

51

119

**Sn**

Tin

50

115

**In**

Indium

49

112

**Cd**

Cadmium

48

108

**Ag**

Silver

47

106

**Pd**

Palladium

46

103

**Rh**

Rhodium

45

101

**Ru**

Ruthenium

44

(96)

**Tc**

Technetium

43

96

**Mo**

Molybdenum

42

93

**Nb**

Niobium

41

91

**Zr**

Zirconium

40

89

**Y**

Yttrium

39

86

**Sr**

Strontium

38

85.5

**Rb**

Rubidium

37

84

**Kr**

Krypton

36

80

##### Br

Bromine

35

79

**Se**

Selenium

34

75

**As**

Arsenic

33

72.5

**Ge**

Germanium

32

70

**Ga**

Gallium

31

65

**Zn**

Zinc

30

63.5

**Cu**

Copper

29

59

**Ni**

Nickel

28

59

**Co**

Cobalt

27

56

**Fe**

Iron

26

55

**Mn**

Manganese

25

52

**Cr**

Chromium

24

51

**V**

Vanadium

23

48

**Ti**

Titanium

22

45

**Sc**

Scandium

21

40

**Ca**

Calcium

20

39

**K**

Potassium

19

40

**Ar**

Argon

18

35.5

**Cl**

Chlorine

17

32

**S**

Sulfur

16

31

**P**

Phosphorus

15

28

**Si**

Silicon

14

27

**Al**

Aluminum

13

24

**Mg**

Magnesium

12

23

**Na**

Sodium

11

20

**Ne**

Neon

10

19

**F**

Flourine

9

16

**O**

Oxygen

8

14

**N**

Nitrogen

7

12

**C**

Carbon

6

11

**B**

Boron

5

9

**Be**

Beryllium

4

7

**Li**

Lithium

3

4

**He**

Helium

2

1

H

Hydrogen

1

Relative atomic mass to

nearest whole number

12

**C**

Carbon

6

Key

Atomic number

(262)

**Lr**

Lawrencium

103

(259)

**No**

Nobelium

102

(258)

**Md**

Mendelevium

101

(257)

**Fm**

Fermium

100

(252)

**Es**

Einsteinium

99

(251)

**Cf**

Californium

98

(247)

**Bk**

Berkelium

97

(247)

**Cm**

Curium

96

(243)

**Am**

Americium

95

244

**Pu**

Plutonium

94

237

**Np**

Neptunium

93

238

**U**

Uranium

92

231

**Pa**

Protactinium

91

232

**Th**

Thorium

90

175

**Lu**

Lutetium

71

173

**Yb**

Ytterbium

70

169

**Tm**

Thulium

69

167

**Er**

Erbium

68

165

**Ho**

Holmium

67

162.5

**Dy**

Dysprosium

66

159

**Tb**

Terbium

65

157

**Gd**

Gadolinium

64

152

**Eu**

Europium

63

150

**Sm**

Samarium

62

145

**Pm**

Promethium

61

144

**Nd**

Neodymium

60

141

**Pr**

Praseodymium

59

140

**Ce**

Cerium

58

|  |
| --- |
| **Directions:** For each of the following questions, choose the letter that **best** answers the question and place it on your answer sheet. |

[1] Liquid hydrogen boils at - 423°F. Express its boiling point in degrees Celsius.

(A) -729 oC

(B)spacer-21 oC

(C)spacer-253 oC

(D)spacer150 oC

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[2] The density of ethanol is 0.798 g/mL. Calculate the mass of 17.4 mL of the liquid?

1. 13.9 g
2. 21.8 g
3. 7.20 x 10-2 g
4. 4.59 x 10-2 g

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[3] 2 cm3 =

1. 2 x 10-3 m3
2. 2 x 10-6 m3
3. 2 x 10-2 m3
4. 2 x 10-9 m3

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[4] The symbol for antimony, lead, and mercury are:

(A) An, Pb, Me

(B) As, Ld, Hg

(C) Sb, Ld, Ag

(D) Sb, Pb, Hg

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[5] The complete symbol  for gallium (Ga) with 39 neutrons and

31 protons is

(A) 

(B) 

(C) 

(D) 

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[6] What is the formula of the ionic compound formed between strontium (Sr) and phosphorus (P)?

1. SrP
2. Sr2P3
3. SrP2
4. Sr3P2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[7] Which one of the following lists of elements contains an alkaline earth metal, a noble gas, and a halogen, respectively?

1. Rb, Y and I.
2. Sr, Zr and Xe.
3. Ba, Kr and F.
4. K, Ni and O

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[8] The formulas of the phosphate ion, hydroxide ion, and the ammonium ion are represented, respectively, as

* 1. PO33- , H- , NH4+
  2. PO43-- , OH- , NH4+
  3. P , OH- , NH3-
  4. none of these.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[9] How many molecules of acetylene (C2H2) are present in 4.50 g of C2H2?

(A) 1.04 x 10-23

(B) 1.04 x 1022

(C) 1.04 x 1023

(D) 1.04 x 10-22

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[10] What is the mass in grams of one atom of cobalt (Co)?

(A) 9.80 × 10-23 g

(B) 9.80 × 10-24 g

(C) 9.28 × 10-23 g

(D) 55.85 g

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[11] Which of the following is a SI base unit?

1. Kelvin
2. minute
3. gram
4. kilometer

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[12] Which of the following organic compounds has the highest molecular weight?

* 1. C4H8O4
  2. C3H8
  3. C5H10O3
  4. C2H6O

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[13] Calculate the percent composition by mass of O in (C6H12O6).

(A) 40 %

(B) 6.6 %

(C) 48.9 %

(D) 53.3 %

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[14] The empirical formula of an organic compound with 85.7% C and 14.3% H is

(A) CH

(B) CH2

(C) C2H

(D) CH4

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[15] An empirical formula of an organic compound is C3H4O2, if the molecular weight of the compound is (216 g/mol), what is the molecular formula of the compound?

(A) C6H8O4

(B) C12H16O8

(C) C9H12O6

(D) C15H20O10

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[16] Balance the following chemical equation:

a Ba(OH)2 + b HBr → c BaBr2 + d H2O

1. a=1, b=2, c=1, d=2
2. a=2, b=2, c=1, d=2
3. a=1, b=3, c=1, d=2
4. a=2, b=1, c=3, d=1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[17] For the reaction:

2 PbS (s) + 3 O2 (g) → 2 PbO (s) + 2 SO2 (g)

If 20.0 mol of PbS reacts with excess oxygen, how many moles of SO2 will be produced?

1. 15.0
2. 5.0
3. 10
4. 20

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[18] How many grams of SF4 can theoretically be prepared from 16 g of SCl2 and 3 g of NaF? The equation of reaction is:

3 SCl2 (g) + 4 NaF (s) → SF4 (g) + S2Cl2 (l) + 4 NaCl (s)

1. 97.2 g
2. 972 g
3. 0.750 g
4. 0.972 g

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[19] Express 850 nm as picometer

(A) 8.5 pm

(B) 850 pm

(C) 8.50 × 10-3 pm

(D) 850 × 103 pm

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[20] How many liters is 0.0370 mL?

(A) 3.7 × 10-5 L

(B) 370 L

(C) 3.7 × 105 L

(D) 3.70 L

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[21] A 80.0 mL sample of 0.436 M NaNO3 is diluted with water to a total volume of 250.0 mL. What is the sodium nitrate concentration in the resulting solution?

(A) 1.4 x 10-2 M

(B) 0.14 M

(C) 1.4 M

(D) 14.0 M

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[22] A lithium ion, Li+, has (p = protons and e = electrons)

(A) 7 p and 3 e

(B) 2 p and 3 e

(C) 3 p and 7 e

(D) 3 p and 2 e

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[23] The elements in a row of the periodic table are known as

1. metal
2. a period
3. a group
4. nonmetal

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[24] Which of these pairs of elements would be most likely to form an ionic compound?

(A) Ni and C

(B) Na and Cl

(C) N and C

(D) N and Zn

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[25] Which one of these species is a cation?

(A) Pt

(B) Rh

(C) Ni+2

(D) Cl-

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[26] The correct name for N2O is

(A) nitrogen dioxide

(B) dinitrogen trioxide

(C) dinitrogen monoxide

(D) dinitrogen dioxide

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[27] Which is the correct formula for nickel (II) chloride?

1. NiCl2
2. Ni2Cl
3. Ni2Cl2
4. NiCl

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[28] A 5.5 g sample of CaCl2 is dissolved in enough water to give 500 mL of solution. What is the molarity of this solution?

(A) 1.0 × 10-2 M

(B) 1.0 × 10-1 M

(C) 1.0 × 10-4 M

(D) 1.0 × 102 M

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[29] An element X, has three stable isotopes:

Mass of Isotope (amu) Percent Abundance (%)

27.977 92.23

28.977 4.67

29.974 3.10

Calculate its average atomic mass

1. 29.3 amu
2. 27.0 amu
3. 30.2 amu
4. 28.1 amu

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

[30] Atoms with the same number of protons and with different number of neutrons are called

(A) ions

(B) isotopes

(C) neutral atoms

(D) different atoms