**Science 10: Chemistry Review(sections 4.1 and 4.2, and Isotopes)**

**Part 1: Atoms, Isotopes and Ions**

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**Use the diagram above to answer questions 1-8**

**Assume all protons , neutrons and electrons are visible in the diagram.**

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+

1. What is the atomic number of the atom/ion shown above? **11**
2. What is the charge of the atom/ion shown above? **+2**
3. What is the atomic mass of the atom shown? **22**
4. How many valence electrons does the atom have? **7**
5. How many valence electrons mast the atom lose/gain to become stable? Be sure to state whether it is losing or gaining. **Gain 1 e-**
6. What element is this? **Sodium**
7. What period is it in? **3**
8. What group/family is it in? **1**
9. Which of the following sub-atomic particles carry charge?

a. Only electrons

b. Only protons

c. Only neutrons

d. Protons and Neutrons

**e. Protons and Electrons**

f. Protons, neutrons and electrons

1. Which of the following are found within the nucleus of an atom?

a. Only electrons

b. Only protons

c. Only neutrons

**d. Protons and Neutrons**

e. Protons and Electrons

f. Protons, neutrons and electrons

11. Draw a table showing the charge, relative mass and location for each of the three subatomic particles within an atom.

|  |  |  |  |
| --- | --- | --- | --- |
| **Particle** | **Charge** | **Mass** | **Location** |
| electron | -1 | 0 | shells |
| proton | +1 | 1 | nucleus |
| neutron | 0 | 1 | nucleus |



**Use this diagram for Questions 12-14**

1. How many valence electrons are illustrated?

a. 18

b. 17

c. 16

d. 8

**e. 7**

1. What element is shown? **chlorine**
2. What is the charge of the particle shown? **0 (neutral)**
3. What is the following particle: 11p+, 12no, 11e-
4. **A neutral sodium atom**
5. A sodium +1 ion
6. A neutral vanadium atom
7. A vanadium ion
8. What is the following particle: 7p+, 7no, 10e-
9. A neutral neon atom
10. A neon -3 ion
11. A neutral nitrogen atom
12. **A nitrogen -3 ion**
13. What element has 12 protons in its nucleus? **magnesium**
14. An isotope of carbon contains 8 neutrons in its nucleus. What is the atomic mass of the isotope? **14**

1. An isotope of potassium has a mass of 40. How many neutrons does it contain? **21**
2. How many electrons are in the valence shell of a neutral Lithium atom? **1**
3. How many electrons are in the valence shell of a neutral sodium atom? **1**
4. How many electrons are in the valence shell of a neutral calcium atom? **2**
5. How many electrons are in the valence shell of a neutral oxygen atom? **6**
6. How many electrons are in the valence shell of a neutral chlorine atom? **7**
7. How many electrons are in the valence shell of a neutral beryllium atom? **2**
8. How many electrons are in the valence shell of a neutral nitrogen atom? **5**
9. How many electrons are in the valence shell of a neutral phosphorous atom? **5**
10. How many electrons are in the valence shell of a neutral potassium atom? **1**
11. How many electrons are in the valence shell of a neutral aluminum atom? **3**
12. How many electrons are in the valence shell of a neutral fluorine atom? **7**
13. How many electrons are in the valence shell of a neutral neon atom? **8**
14. How many electrons are in the valence shell of a neutral hydrogen atom? **1**
15. How many electrons are in the valence shell of a neutral francium atom? **1**
16. What must a neutral calcium atom do in order to become a stable calcium ion? **lose 2 electrons**
17. What must a neutral chlorine atom do to form a stable chloride ion? **gain 1 electron**
18. What must a neutral nitrogen atom do to become a stable nitride ion? **gain 3 electrons**
19. What must a neutral aluminum atom do to become a stable aluminum ion? **lose 3 electrons**
20. What must a neutral oxygen atom do to become a stable oxide ion? **gain 2 electrons**
21. What must a neutral potassium atom do to become a stable potassium ion? **lose 1 electron**
22. What must a neutral beryllium atom do to become a stable beryllium ion? **lose 2 electrons**
23. What must a neutral sodium atom do to become a stable sodium ion? **lose 1 electron**
24. What must a neutral sulfur atom do to become a stable sulfide ion? **gain 2 electrons**
25. What must a neutral bromine atom do to become a stable bromide ion? **gain 1 electron**
26. What must a neutral chromium atom do to become a stable chromium (II) ion? **lose 2 electrons**
27. What must a neutral nickel atom do to become a stable nickel (III) ion? **lose 3 electrons**
28. What must a neutral cobalt atom do to become a stable cobalt (II) ion? **lose 2 electrons**
29. What is the following particle: 27p+, 32no, 25e-?
    1. **A cobalt (II) ion**
    2. A cobalt (III) ion
    3. A cobalt (II) atom (neutral)
    4. A cobalt (III) atom (neutral)
    5. A manganese atom (neutral)
30. Which of the following atoms will lose 2 electrons to for a stable ion?

a. Oxygen

b. Nitrogen

c. Sodium

d. Chlorine

**e. Magnesium**

1. What is the difference between a metal and a non-metal in terms of ion formation?

**metals lose electrons to form stable ions, non-metals gain electrons to form stable ions**

1. What is the name for an ion with a positive charge?

**CATION**

1. What is the name of an ion with a negative charge?

**ANION**

1. Which subatomic particle(s) make up most of the mass of an atom?
   1. Neutrons only
   2. Protons only
   3. Electrons and neutrons
   4. **Protons and neutrons**
   5. Protons and electrons
2. In order to form a stable ion, an atom of potassium must:

a. Lose 2 electrons

b. Gain 2 electrons

**c. Lose 1 electron**

d. Gain 1 electron

e. None of the above

1. When an atom forms an ion there is a change in the number of:

a. **electrons**

b. protons

c. neutrons

d. nuclei

e. molecules

**Ionic Compounds**

55. Which one of the following compounds is ionic?

* 1. B2O
  2. P2F5
  3. H2
  4. **AlF3**
  5. CO32-

56. What is the name of PbO2? **Lead(IV) Oxide**

57. What is the name of CaCl2 **Calcium Chloride**

58. What is the correct name for the following ionic compound: Ca(NO2)2 ?

a. calcium dinitrogen tetraoxide

b. calcium dinitrite

c. calcium dinitrate

d. calcium nitrate

**e. calcium nitrite**

59. What is the correct formula for beryllium oxide? **BeO**

60. What is the correct formula for calcium phosphide? **Ca3P2**

61. What is the correct formula for cobalt(III) fluoride? **CoF3**

62. Which name and formula match correctly?

a. iron(II) oxide, FeO2

b. magnesium fluoride, MgF

**c. sodium sulphide, Na2S**

d. aluminum iodide, Al(IO3)3

e. lithium dichromate, LiCr2

1. Write the formula and name for the ionic compound formed between magnesium and bromine.

**MgBr2 Magnesium bromide**

1. Write the formula and name for the ionic compound formed between bromine and magnesium.

**MgBr2 Magnesium bromide**

1. Write the formula and name for the ionic compound formed between magnesium and chlorine.

**MgCl2 Magnesium chloride**

1. Write the formula and name for the ionic compound formed between magnesium and fluorine.

**MgF2 Magnesium fluoride**

1. Write the formula and name for the ionic compound formed between magnesium and iodine.

**MgI2 Magnesium Iodide**

1. Write the formula and name for the ionic compound formed between magnesium and oxygen.

**MgO Magnesium oxide**

1. Write the formula and name for the ionic compound formed between magnesium and sulfur.

**MgS Magnesium sulfide**

1. Write the formula and name for the ionic compound formed between magnesium and nitrogen.

**Mg3N2 Magnesium nitride**

1. Write the formula and name for the ionic compound formed between sodium and bromine.

**NaBr Sodium bromide**

1. Write the formula and name for the ionic compound formed between sodium and oxygen.

**Na2O Sodium oxide**

1. Write the formula and name for the ionic compound formed between nitrogen and sodium.

**Na3N Sodium nitride**

1. Write the formula and name for the ionic compound formed between calcium and bromine.

**CaBr2 Calcium bromide**

1. Write the formula and name for the ionic compound formed between calcium and oxygen.

**CaO Calcium oxide**

1. Write the formula and name for the ionic compound formed between calcium and phosphorous.

**Ca3P2 Calcium phosphide**

1. Write the formula and name for the ionic compound formed between magnesium and carbonate.

**MgCO3 Magnesium carbonate**

1. Write the formula and name for the ionic compound formed between magnesium and nitrate.

**Mg(NO3)2 Magnesium nitrate**

1. Write the formula and name for the ionic compound formed between sodium and chromate.

**Na2CrO4 Sodium chromate**

1. Write the formula and name for the ionic compound formed between lithium and phosphite.

**Li3PO3 Lithium phosphite**

1. Write the formula and name for the ionic compound formed between copper (I) and bromine.

**CuBr Copper(I) bromide**

1. Write the formula and name for the ionic compound formed between copper (II) and bromine.

**CuBr2 Copper(II) bromide**

1. Write the formula and name for the ionic compound formed between Nickel(III) and oxygen.

**Ni2O3 Nickel(III) oxide**

1. Write the formula and name for the ionic compound formed between Cobalt(III)and hydroxide.

**Co(OH)3 Cobalt(III) hydroxide**

1. Write the formula and name for the ionic compound formed between Manganese(IV) and dicromate.

**Mn(CrO4)2 Manganese(IV) chromate**

1. Write the formula and name for the ionic compound formed between ammonium and chlorine.

**NH4Cl Ammonium chloride**

**Part Two: Covalent Compounds**

1. What is the chemical formula for pentanitrogen dioxide? **N5O2**
2. What is the chemical formula for phosphorus trifluoride? **PF3**



1. What molecule is show in the Bohr diagram to the right?
   1. BeH2
   2. **H2O**
   3. H2S
   4. H2Ne
   5. MgO2
2. What is the correct name for the following covalent compound: S3O6 ?

**trisulfur hexoxide**

90. What is the correct name of the following compound: N4I9? **tetranitrogen nonaiodide**

91. Which of the following is a covalent compound?

a. KCl

b. CaO

**c. CO**

d. KI

e. MgS

**Use the Lewis diagram below to answer questions 92 and 93**

Br

Si

Br

Br

Br

92. In the above Lewis diagram how many **pairs** of shared electrons are there?

a. 0

b. 1

c. 2

d. 3

**e. 4**

93. What is the name and formula of the molecule shown?

a. silicon bromide, SiBr4

**b. silicon tetrabromide, SiBr4**

c. bromine(IV) silicide, Br4Si

d. silicon(IV) bromide, SiBr4

e. silicon tetrabromide, SiBr

94. Which of the following is true of covalent compounds?

**a. they consist of non-metals only.**

b. They involve the transfer of valence shell electrons.

c. They are named without using prefixes.

d. They consist of one metal and one non-metal.

e. they consist of only metals.

95. What is true of the following 7 elements: hydrogen, nitrogen, oxygen, fluorine, chlorine, bromine and iodine?

a. They are all poisonous.

b. They are all noble gases.

c. They all will form ionic bonds with themselves to form diatomic molecules.

**d. They all will form covalent bonds with themselves to form diatomic molecules.**

e. They are all radioactive.

**Part Four: Written Response**

1. a. Draw a Lewis diagram of a neutral calcium atom.

Ca

b. Draw a Lewis diagram of a neutral chlorine atom.

Cl

c. Draw a Bohr diagram showing a neutral sodium atom.

11p

d. Draw a Lewis diagram showing a molecule of a stable fluoride ion.

-1

F

c. Draw a Lewis diagram of a stable beryllium ion.

+2

Be

d. Draw a Bohr diagram of a stable beryllium ion.

+2

4p

e. Draw a Bohr diagram of a stable chloride ion.

17p

f. Draw a Lewis diagram of a lithium oxide molecule.

[ Li ]+[ O ]2-[ Li ]+

g. Draw a Lewis diagram of a molecule of nitrogen trichloride

Cl

Cl N Cl

h. Draw a Lewis diagram of a molecule of calcium chloride.

* +2 -

[ Cl ] [ Ca ] [ Cl ]

i. Draw a Lewis diagram of a molecule of dichlorine monoxide.

Cl O Cl

2. For each of the following write the formula **AND** classify as ionic or covalent. (2 marks each)

a. dichlorine monoxide Cl2O Covalent (C)

b. trisulfur tetraiodide S3I4 C

c. Iron (III) bromide FeBr3 Ionic (I)

d. calcium permanganate Ca(MnO4)2 I

e. potassium nitride K3N I

f. beryllium nitride Be3N2 I

g. nickel (II) fluoride NiF2 I

h. sodium sulfite Na2SO3 I

i. diphosphorous trichloride P2Cl3 C

j. carbon tetrachloride CCl4 C

k. Copper(I) carbonate Cu2CO3 I

l. chromium(III) sulfate Cr2(SO4)3 I

m. bromine monoxide BrO I

3. For each of the following write the proper name **AND** classify as ionic or covalent. (2 marks each)

a. PCl2 phosphorous dichloride C

b. PbF2  Lead(II) fluoride I

c. Ca(ClO3)2 Calcium chlorate I

d. S3F7 trisulfur heptafluoride C

e. CaF2 calcium fluoride I

f. N2S4 dinitrogen tetrasufide C

g. VO2 vanadium(IV) oxide I

h. Ti2(CrO4)3 titanium(III) chromate I

i. K2S potassium sulfide I

j. TiN titanium(III) nitride I