

CHEMISTRY

Sc 10

Sc. 10 chem unit review | 1

Science 10

Name: Key

Unit 2 Chemistry Review (Chapters 4-7)

1. Atom and ions are made of the subatomic particles protons, neutrons, and electrons.

protons = atomic number

neutrons = atomic mass – atomic number

electrons = protons (if an atom)

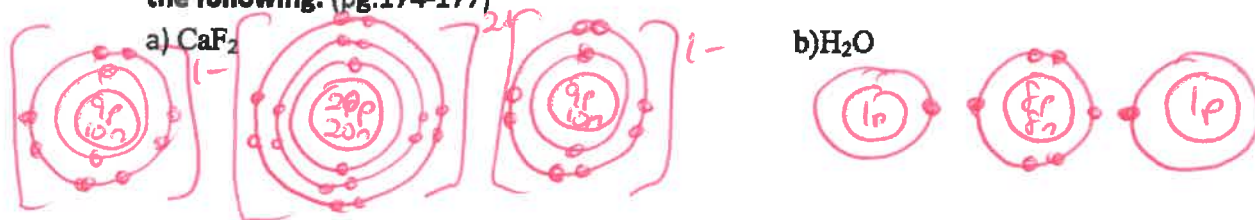
electrons = protons + negative charge (if a negative ion)

electrons = protons – positive charge (if a positive ion)

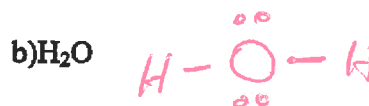
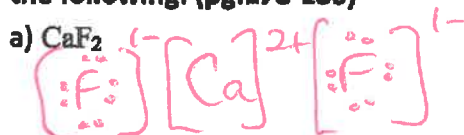
Fill in the following: (pg.170-171)

	Symbol	Protons	Neutrons	Electrons
Iron atom	<u>Fe</u>	<u>26</u>	<u>30</u>	<u>26</u>
Iron ion	<u>Fe²⁺/Fe³⁺</u>	<u>26</u>	<u>30</u>	<u>24/23</u>

2. Bohr diagrams show all of the electrons in an atom, ion or compound. (2,8,8) In covalent compounds atoms share electrons to fill outer orbit. In ionic compounds atoms transfer electrons to become ions (square brackets are used around ions). Draw the following: (pg.174-177)



3. Lewis diagrams show only the valence electrons in an atom, ion, or compound. Draw the following: (pg.178-180)



4. Ionic compounds are made of a positive and negative ion; often a metal and a non-metal. Covalent compounds are made of two or more non-metals. They have different naming systems. Name or write the formula of the following: (pg.186-196)

a) Manganese (III) fluoride MnF₃

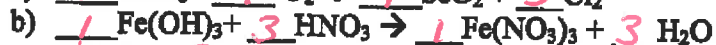
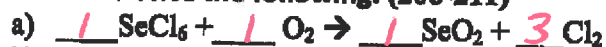
b) AuCl_3 gold (III) chloride

c) P_4O_{10} tetraphosphorus decaoxide

d) $\text{Be}(\text{NO}_3)_2$ beryllium nitrate

e) dinitrogen monoxide N₂O

5. When balancing chemical equations, be sure to have the same number of atoms of each element on the reactant and product side in order to obey the law of conservation of mass. Balance the following: (206-211)



single replacement
neutralization
synthesis
double replacement

6. Acids (begin with H) and bases (end in OH) are classified according to the pH scale. Acids(0-7), neutral (7), and bases (7-14). Many indicators help to classify them as acids or bases. (pg. 223-224)

State the colour and pH.

a) Lemon juice in bromothymol blue

Colour? yellow

pH? 2

Acid/base/neutral? acid

b) Soap in phenolphthalein

pink

10

base

c) Milk in litmus

red

6

acid

7. When naming aqueous acids, final ions ending in "ide" become hydro_____ic acid, final ions ending in "ate" become _____ic acid, and final ions ending in "ite" become _____ous acid. (pg.225-226) Practice the following:

a. HNO_2 Acid, base or salt?

acid

Compound name

nitrous acid

b. Mg(OH)_2

base

magnesium hydroxide

c. HF

acid

hydrofluoric acid

d. $\text{Ca(SO}_4)_2$

salt

calcium sulphate

or sulfate

8. Salts are ionic compounds that are produced in the neutralization between an acid and a base. They are involved in the following reactions: (pg.236-239)

Acid+Metal $\rightarrow$ Hydrogen gas+salt

Acid+carbonate $\rightarrow$ Carbon dioxide +water+salt

Metal oxide + water $\rightarrow$ base

Non-metal oxide +water $\rightarrow$ acid

Predict the products of the following:



9. Organic compound and long covalent compounds made mainly of carbon and hydrogen. (except carbon dioxide, carbon monoxide, and carbonates) (pg.247)
The organic molecule propane has the chemical formula C_3H_8 . Draw a model of propane.

10. There are several types of reaction. Identify the reactions in question 5. (synthesis, single replacement, double replacement, neutralization, and combustion) (pg.258-265)

11. Several factors can speed up a chemical reaction. Try identifying the following. (catalyst, temperature, surface area, and concentration) (pg.174-177)

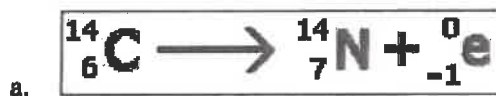
a) Cutting a solid reactant into little pieces _____

b) Adding 6M HCl instead of 1M _____

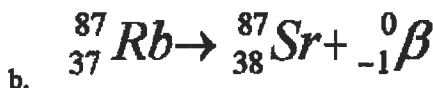
c) Putting the beaker on a hot plate _____

12. Isotopes are atoms with different number of neutrons and thus different atomic masses. Some isotopes undergo radioactive decay. (Alpha, Beta, and gamma) (pg.294- 298)

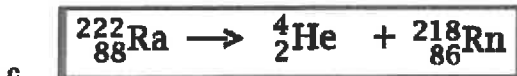
LABEL:



β



β



α



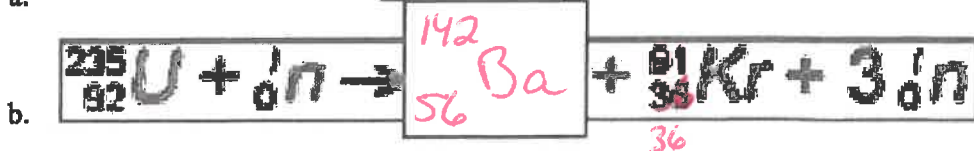
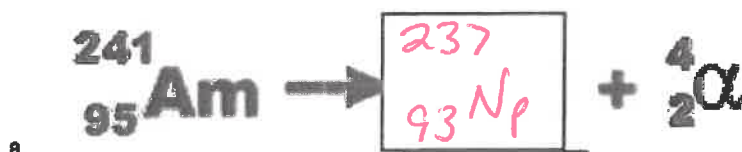
γ

13. The half life of a radioisotope is the time it takes for half of an unstable isotope to decay. (pg. 304-308)

How old is a sample of carbon-14 that has undergone 2 half lives? 11 460 years

What percentage of it has decayed into nitrogen-14? 75%

14. Some isotope can undergo fission (splitting the nucleus) for nuclear power, or fusion (joining of two nuclei) in the sun and stars. Identify the missing component of the following nuclear reactions. (pg. 316-321)



**REFER TO
DATA PAGES**

For this section of the examination, refer to:

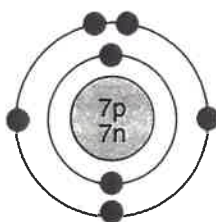
- Names, Formulae and Charges of Some Common Ions on Data Page 1
- Alphabetical Listing of the Elements on Data Page 2
- Periodic Table of the Elements on Data Page 3

30. *True or false?* The symbol for helium with a mass number of 4 is ${}^4_2\text{He}$.

- ☒ A. True
B. False

31. *True or false?* The following represents the Bohr model for a nitrogen atom.

Bohr Model



- ☒ A. True
B. False

32. What do alkali metal atoms tend to do when they become ions?

- A. gain one proton
B. lose one proton
☒ C. lose one electron
D. gain one electron

33. What do a sodium ion and a neon atom have in common?

I	They have full outer shells. ✓
II	They have the same number of protons. ✗
III	They have the same number of electrons. ✓
IV	They have the same number of electron shells. ✓

- A. I and II only
 B. I and III only
 C. III and IV only
 D. I, III and IV only



Use the following information to answer questions 34 to 38.

35	-
Br	
Bromine	
79.9	

45	3+
Rh	4+
Rhodium	
102.9	

58	3+
Ce	4+
Cerium	
140.1	

Match each Description on the left with the correct Atom/Ion on the right.	
Description	Atom/Ion
34. It has 35 protons and gained 1 electron. A	A. bromide ion
35. It has 45 electrons and 58 neutrons. D	B. bromine atom
36. It has 58 protons and lost 4 electrons. E	C. rhodium ion
37. It has 45 protons and 42 electrons. C	D. rhodium atom
38. It has 58 electrons and 58 protons. F	E. cerium ion
	F. cerium atom

39. True or false? The name of the compound SO₂ is sulphur dioxide.

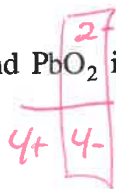
- A. True
 B. False

40. True or false? The formula NH₄⁺ represents a polyatomic ion.

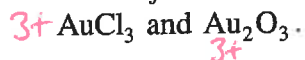
- A. True
 B. False

41. True or false? The name given to the compound PbO_2 is lead(II) oxide.

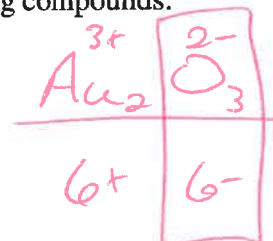
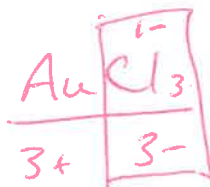
- A. True
B. False



42. True or false? Gold has the same ion charge in both of the following compounds:



- A. True
B. False



43. What is the formula for the meat preservative sodium nitrite?

- A. Na_2NO_3
B. Na_2NO_2
C. NaNO_3
D. NaNO_2



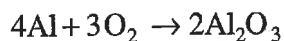
Use the following information to answer questions 44 and 45.

Aluminum combines with oxygen to form aluminum oxide, Al_2O_3 .

44. Which of the following is correct about Al_2O_3 ?

- A. It represents a polyatomic ion. ✗
B. It represents an ionic compound.
C. It represents a diatomic molecule.
D. It represents a covalent compound.

45. True or false? The following represents the balanced equation for the reaction described above.



- A. True
B. False

Use the following information to answer questions 46 and 47.



46. What does the formula H_2SO_4 represent?

- A. a salt
- B. a base
- ☒ C. an acid
- D. a polyatomic ion

47. What are the products of this reaction?

I	H_2
II	H_2O ✓
III	ZnO
IV	ZnSO_4 ✓

- A. I and III only
- B. I and IV only
- C. II and III only
- ☒ D. II and IV only

Use the following information to answer questions 48 and 49.

A piece of zinc metal is placed in a test tube containing hydrochloric acid, HCl.

A water-soluble compound, zinc chloride, forms and bubbles are seen.

48. What type of gas formed during this reaction?

- A. oxygen
- B. chlorine
- ☒ C. hydrogen
- D. carbon dioxide



49. What type of chemical reaction is described above?

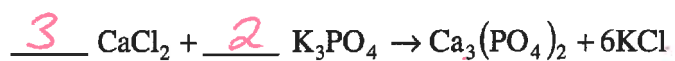
- A. synthesis
- B. neutralization
- C. decomposition
- ☒ D. single replacement

50. Which of the following reactions represent a decomposition reaction?

I	$\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$	Decomp.
II	$2\text{KI} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbI}_2 + 2\text{KNO}_3$	DR
III	Calcium reacts with water to produce calcium oxide.	Syn.
IV	Zinc chloride is broken down into zinc and chlorine gas.	Decomp.

- A. I and III only
- ☒ B. I and IV only
- C. II and III only
- D. II and IV only

Use the following unbalanced equation to answer question 51.



51. Which of the following correctly balances the equation?

- A. $\text{CaCl}_2 + \text{K}_3\text{PO}_4$
- B. $3\text{CaCl}_2 + \text{K}_3\text{PO}_4$
- C. $2\text{CaCl}_2 + 3\text{K}_3\text{PO}_4$
- ☒ D. $3\text{CaCl}_2 + 2\text{K}_3\text{PO}_4$

Use the following article to answer questions 52 and 53.

The Subatomic Assembly of Hydrogen

My first exercise in hydrogen production was to drop a 9-volt battery into a cup of water. I had managed to assemble pure hydrogen gas out of subatomic particles. The protons came from the water itself, which always has a bunch of them running around loose (naked protons are also called hydrogen ions). The electrons came from the battery. When I injected the electrons into the water, they latched onto the protons to form a few small bubbles of hydrogen gas. From there I added salt to the water to increase its conductivity, thereby increasing the flow of current and the number of electrons available to pair up with all those wild protons. As current flows from the 9-volt battery through a cup of water, bubbles of hydrogen form on the negative electrode while oxygen accumulates on the positive one. To determine which electrode produces which gas, hold a match near the surface of the water. The hydrogen gas bubbling off the negative electrode crackles and flashes as it reacts with oxygen in the air, forming water. Although it's flammable, you won't generate enough with a 9-volt battery to make it dangerous.

Adapted from an article by
Theodore Gray in *Popular Science*, December 2003, p. 146.

52. Which of the following statements is supported by the article?

I	Salt increases the conductivity of water. ✓
II	Water decomposed into hydrogen gas and oxygen gas. ✓
III	Both electrons and protons are needed to produce hydrogen. ✓

- A. II only
- B. I and III only
- C. II and III only
- ☒ D. I, II and III

53. What type of reaction occurs when a match is held near the surface of the water at the negative electrode?

- ☒ A. synthesis
- B. neutralization
- C. decomposition
- D. single replacement

