G11 Chemistry: Class 2 Homework

MULTIPLE CHOICE: Circle the correct answer.

1. Alpha particles are identical to
   A) protons.
   B) helium atoms.
   C) hydrogen atoms.
   D) helium nuclei.
   E) electrons.

2. Beta particles are identical to
   A) protons.
   B) helium atoms.
   C) hydrogen atoms.
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3. A radioisotope decays to give an alpha particle and Pb-208. What was the original element?
   A) Se
   B) Bi
   C) Po
   D) Hg
   E) Rn

4. When atoms of beryllium-9 are bombarded with alpha particles, neutrons are produced. What new isotope is also formed?

$$^{4}_{2}He + {}^{9}_{4}Be \rightarrow {}^{1}_{0}n + ?$$

A) $^{12}_{6}C$ B) $^{5}_{3}Li$ C) $^{8}_{3}Li$ D) $^{10}_{5}B$ E) $^{12}_{5}B$

5. What is the missing symbol in this plutonium fission reaction?

$$^{239}_{94}Pu + {}^{1}_{0}n \rightarrow {}^{97}_{38}Sr + {}^{a}_{b}X + 3{}^{1}_{0}n$$

A) $^{148}_{56}Ba$ B) $^{0}_{-1}\beta$ C) $^{140}_{54}Xe$ D) $^{91}_{38}Sr$ E) $^{140}_{56}Ba$

6. Predict the other product of the following nuclear transformation.

$$^{6}_{3}Li + {}^{1}_{0}n \rightarrow ? + {}^{4}_{2}He$$

A) $^{6}_{2}He$ B) $^{2}_{1}H$ C) $^{3}_{1}H$ D) $^{0}_{+1}\beta$ E) $^{5}_{1}H$

7. Sulfur-35 decays by beta emission. The decay product is

A) $^{35}_{15}P$ B) $^{34}_{16}S$ C) $^{31}_{30}Si$ D) $^{34}_{17}Cl$ E) $^{35}_{17}Cl$

8. The only stable isotope of aluminum is aluminum-27. What type of radioactive decay should be expected from $^{28}_{13}Al$?

A) $^{1}_{1}H$ B) $^{1}_{0}n$ C) $^{0}_{-1}\beta$ D) $^{0}_{+1}\beta$ E) $^{4}_{2}He$

9. A polar covalent bond would form in which one of the following pairs of atoms?
   A) Cl – Cl
   B) Si – Si
   C) Ca – Cl
   D) C – Br
   E) P – Cl

10. A *nonpolar* covalent bond (i.e., pure covalent) would form in which one of the following pairs of atoms?
   A) Na – Cl
   B) H – Cl
   C) Li – Br
   D) Se – Br
   E) Br – Br

11. The covalent bond with the *greatest* polarity would form in which of the atom pairs below?
   A) Br – Br
   B) S – O
   C) C – P
   D) C – O
   E) B – O

12. Classify the O – H bond in CH_3OH as ionic, polar covalent, or nonpolar covalent.
   A) ionic
   B) polar covalent
   C) nonpolar covalent

13. Classify the Ca – Cl bond in $CaCl_2$ as ionic, polar covalent, or nonpolar covalent.
   A) ionic
   B) polar covalent
   C) nonpolar covalent

SHORT ANSWER: Answer the following questions.

14. Radon-222, $^{222}_{86}Rn$ is used to decay by alpha particle emission. Write a balanced nuclear equation and name the element produced in this decay process. **[2 marks]**

15. Write the balanced nuclear equation for the radioactive decay of potassium-40 by emission of a beta-particle. **[2 marks]**

16. What radioisotope decays by beta particle emission to form $^{47}_{21}Sc$? **[2 marks]**

17. Complete each nuclear equation. Then state the type of nuclear reaction that each equation represents. **[14 marks]**

Type of Nuclear Reaction

a) $^{232}_{90}Th$ + ? → $^{233}_{90}Th$

b) $^{233}_{91}Pa$ → $^{233}_{92}U$ + ?

c) $^{226}_{88}Ra$ → ? + $^{4}_{2}He$

d) $^{210}_{83}Bi$ → $^{206}_{81}Tl$ + ?

e) $^{210}_{83}Bi$ → ? + $^{206}_{81}Tl$ + ?

f) ? + $^{1}_{0}n$ → $^{90}_{38}Sr$ + $^{143}_{54}Xe$ + $3^{1}_{0}n$

g) $^{6}_{3}Li$ + $^{2}_{1}H$ → 2?

18. Write a balanced nuclear equation to describe each of the following statements.

a. Radon-222 undergoes alpha decay forming Polonium-218 **[1 mark]**

b. Polonium-218 decays to Lead-214, emitting one other particle **[1 mark]**

19. Complete the table below: **[8 marks]**

Bond	Location of Partial Charges and EN value	ΔEN	Bond Type
C-F			
O-N			
Cl-Cl			
Cu-O			
Si-H			
Na-F			
Fe-O			
Mn-O			