General Chemistry II, CHE 121-003 Instructor: J. H. Niewahner
Test 4. Chapters 20-23, Chang, 7th ed. April 25, 2002

Name _____

1(06) For each pair of isotopes listed, predict which one is the less stable.

a) $^{6}Li$ or $^{9}Li$ b) $^{23}Na$ or $^{25}Na$ c) $^{48}Ca$ or $^{48}Sc$

2(06) Complete the following nuclear equations and identify X in each case.

a) $^{131}I \rightarrow {}^{135}Xe + X$ X = _____

b) $^{40}K \rightarrow {}^{0}\beta + X$ X = _____

c) $^{235}U + {}^{1}n \rightarrow {}^{90}Sr + {}^{135}Te + 2\ X$ X = _____

3(04) List the two fissionable nuclides that are used as fuel in nuclear reactors.
a) _____ b) _____

4(04) List one of the elements used in control rods. _____
What is the purpose of the control rods?

5(04) List the substance used as the moderator in "light" water nuclear reactors. _____
What is the purpose of the moderator?

6(04) A wooden artifact has a C-14 activity of 2500 counts/min for a 1.0 g sample. A sample of the same wood from a recently cut tree has a C-14 activity of 20,000 counts/min for a 1.0 g sample. If the half-life of C-14 is 5700 years, how old is the artifact?
a) 713 yrs b) 5700 years c) 17100 years d) 45600 years

7(06) List 3 of the main steps used in the extraction of a metal from an ore.
a) _____ b) _____ c) _____

8(03) Write the chemical equation that represents the industrial reduction of iron(III) oxide to iron.

9(02) Name the ore from which aluminum is produced. _____

10(04) Aluminum is obtained by which one of the following processes?
a) chemical reduction b) electrolysis c) smelting d) distillation

11(14) Complete ONLY 7 of the following chemical equations.

a) $K(s) + O_2(g) \rightarrow$

b) $Ca(s) + Cl_2(g) \rightarrow$

c) $Na(s) + H_2O(l) \rightarrow$

d) $CaO(s) + H_2O(l) \rightarrow$

e) $Al(s) + O_2(g) \rightarrow$

f) $NaH(s) + H_2O(l) \rightarrow$

g) $H_2(g) + Li(s) \rightarrow$

h) $Li(s) + N_2(g) \rightarrow$

i) $P_4(s) + O_2(g) \rightarrow$

j) $KClO_3 \xrightarrow{MnO_2,\ \Delta} \rightarrow$

12(04) List the use of ONLY 4 of the following.

a) $Na_2CO_3$ _____ b) NaOH _____

c) $Mg(OH)_2$ _____ d) $H_2SO_4$ _____

e) $NH_3$ _____

13(04) List the allotropes of:

a) carbon: _____

b) oxygen _____

14(04) Write the chemical equations that represent the laboratory preparation of ONLY 2 of the following.

a) $H_2$

b) $O_2$

c) $N_2$

15(06) Write the chemical equations that represent the industrial preparation of either sulfuric acid, ammonia, or nitric acid.

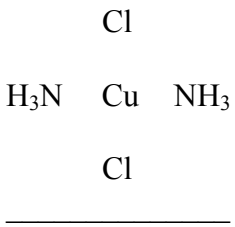
16(04) Write the Lewis formula for $PBr_3$ and indicate the geometry of the molecule.

17(03) List the isotopes of hydrogen. _____

18(06) Complete the following statements for the complex $[Cr(C_2O_4)_2(H_2O)_2]^{1-}$.
a) The oxidation number of Cr is _____. b) The coordination number of Cr is _____. c) _____ is a bidentate ligand.

19(04) Which two oxides are the major source of acid rain? a) _____ b) _____

20(03) Label the following as either cis or trans isomers.



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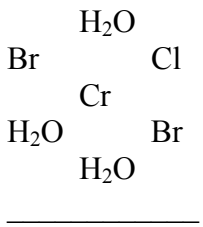

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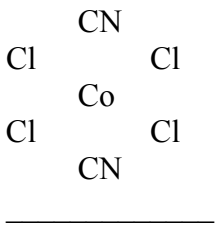

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21(2) Which one of the following elements is the most metallic?
a) Al b) Ca c) F d) Si

22(03) Write the electron configuration for Fe.