1. Balance the following reaction (no fractions) 

\[
C_8H_{18} + O_2 \rightarrow CO_2 + H_2O
\]

(4)

2. Predict the product, balance and using the solubility rules, attached to back of exam, determine the state of the products.

Fe (s) + HCl (aq) \rightarrow

AgNO_3 (aq) + Na_3PO_4 (aq) \rightarrow

(8)

3. Write the electron configuration and circle the valence electrons for the following.

Ca

Br

(10)

4. Write the electron configuration of the following ions and state which noble gas they are isoelectronic with.

\[
p^{-3}
\]

\[
Mg^{+2}
\]

(10)
5. Circle the correct answer. (10)

- largest size: Al, Al⁺, Al³⁺
- largest IE for next electron removed: Al, Al⁺, Al³⁺
- smallest atomic size: Na, Al, S
- most electronegative metal: Na, Al, S
- highest electron affinity: N, O, F

6. How many carbon atoms are contained in a 1.2 carat diamond (pure carbon). (8)

(1 carat = 200 mg)

7. Draw the Lewis dot structures for the two compounds given below. The carbon is in the center. Electronegativites are given on the last page. (10)

CS₂ \hspace{2cm} CH₂Cl₂

What is the direction of electron migration in the C-Cl bond?
8. How many unpaired electrons does a manganese atom have? (3)

A reaction in aqueous solution in a beaker was endothermic. How would detect this? (3)

What type of bonding occurs in each compound? Why? (4)

KCl

NO

9. How many grams of ammonia can be produced by reacting 100 grams hydrogen with an excess amount of nitrogen? (10)

\[ \text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3 \]