

84

Wednesday, October 25, 2000

Time: 2 hours

Name: ANSWERS

Student Number: _____

This exam consists of six pages of questions, a periodic table, and a sheet containing the symbols, masses, and names of the elements. Please ensure that you have a complete paper and, if you do not, obtain one from me immediately. Good luck!

- 1) [5 marks] A certain element occurs naturally as five different isotopes. Use this information and the data provided in the table below to complete the rest of the table.

Nuclide Symbol	Mass (amu)	Percent Abundance
4624 22 Ti	45.9526	8.25
4728 22 Ti	46.9518	7.44
4826 22 Ti	47.9479	73.72
4927 22 Ti	48.9479	5.41
50 22 Ti	49.9448	5.18

$$100 - 8.25 - 7.44 - 5.41 - 5.18 = 73.72$$

~~4826~~
$$45.9526 \times 0.0825$$

$$46.9518 \times 0.0744$$

$$47.9479 \times 0.7372$$

$$48.9479 \times 0.0541$$

$$49.9448 \times 0.0518$$

$$47.867 \Rightarrow \text{Ti} \quad (Z=22)$$

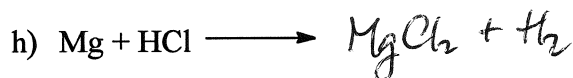
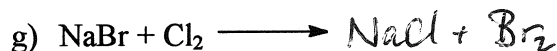
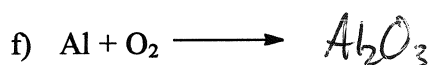
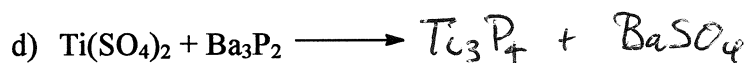
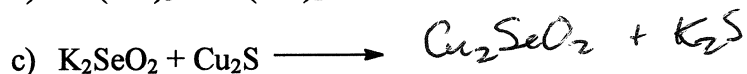
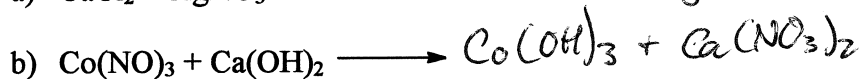
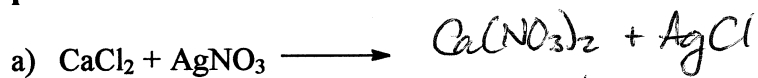
[20 marks] Name the following compounds:

- a) Al_2O_3 aluminum oxide
- b) Ca_3N_2 calcium nitride
- c) PbBr_2 lead (II) bromide
- d) CuI copper (I) iodide
- e) Cs_2SO_3 cesium sulphite
- f) AgBrO_4 silver (I) perbromate
- g) Na_2SeO_3 sodium selenite
- h) NH_4NO ammonium hyponitrite
- i) $\text{H}_2\text{SO}_2(\text{aq})$ hyposulphurous acid
- j) $\text{H}_3\text{P}(\text{aq})$ hydrophosphoric acid
- k) $\text{Os}(\text{OH})_3$ osmium (III) hydroxide
- l) $\text{Ca}(\text{OH})_2$ calcium hydroxide
- m) $\text{HF}(\text{g})$ hydrogen fluoride
- n) SO_2 sulphur dioxide
- o) BrF_3 bromine trifluoride
- p) SF_6 sulphur hexafluoride
- q) CBr_4 carbon tetrabromide
- r) F_2O difluorine monoxide
- s) $\text{Na}_2\text{CO}_3 \cdot 9\text{H}_2\text{O}$ sodium carbonate nonahydrate
- t) $\text{Fe}(\text{ClO})_3 \cdot 8\text{H}_2\text{O}$ iron (III) hypochlorite octahydrate

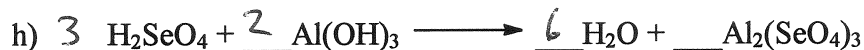
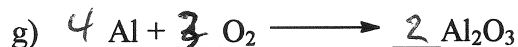
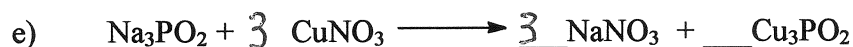
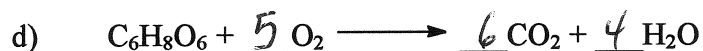
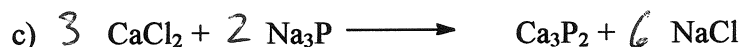
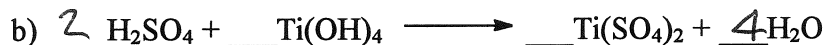
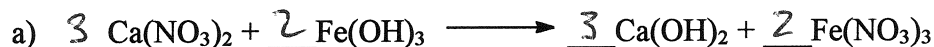
2) [20 marks] Give the formula for the compounds which have the following names. Indicate phases where necessary.

- a) sodium sulphide Na_2S
- b) iron(III) phosphite FePO_3
- c) aluminum hyponitrite $\text{Al}(\text{NO})_2$
- d) silver(I) bromate AgBrO_3
- e) nickel(III) carbonate dihydrate $\text{Ni}_2(\text{CO}_3)_3 \cdot 2\text{H}_2\text{O}$
- f) periodic acid $\text{HIO}_4(\text{aq})$
- g) tin(II) hydroxide $\text{Sn}(\text{OH})_2$
- h) hydroiodic acid $\text{HI}(\text{aq})$
- i) tetraphosphorus decoxide P_4O_{10}
- j) carbon tetrabromide CBr_4
- k) barium oxide BaO
- l) copper(I) selenide Cu_2Se
- m) indium hypophosphite InPO_2
- n) mercury(II) oxide HgO
- o) iron(II) selenite pentahydrate $\text{FeSeO}_3 \cdot 5\text{H}_2\text{O}$
- p) hydrogen sulphide $\text{H}_2\text{S}(\text{g})$
- q) potassium hydroxide KOH
- r) dinitrogen monoxide N_2O
- s) argon difluoride ArF_2
- t) zirconium(III) sulphide Zr_2S_3

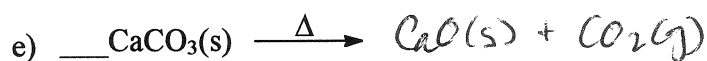
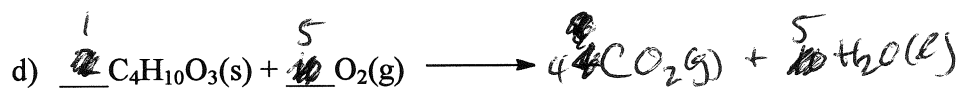
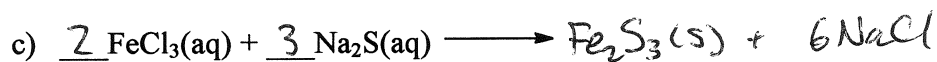
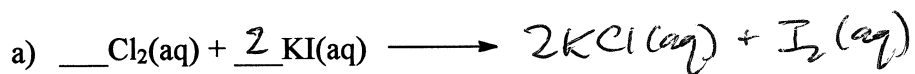
3) [8 marks] Assume that each of the following reactions occurs and provide the formulae for the products formed. Do not balance the equations or indicate the phases of the products.



4) [8 marks] Balance each of the following reactions.



- 5) ¹⁶ [8 marks] Complete and balance the following equations. Indicate the phases of all products. If you do not expect a reaction to occur, write "NR" to the right of the arrow. Provide only the balanced molecular equation. Assume that all products are at room temperature.



6) ⁵ [2 marks] Which of the reactions in question 5 is/are:

Single Displacement	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)
Double Displacement	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)
Decomposition	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)
Combustion	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)
Combination	5(a)	5(b)	5(c)	5(d)	5(e)	5(f)	5(g)	5(h)

7) [2 marks] A 50.00 mL sample of solution A (concentration 50.00 g KCl/L) was taken and diluted to 500.0 mL to form solution B. What is the concentration (in g/L) of solution B?

$$50.00 \text{ mL} \times \frac{1 \text{ L}}{1000 \text{ mL}} \times 50.00 \frac{\text{g}}{\text{L}} = 2.500 \text{ g KCl}$$

$$\frac{2.500 \text{ g KCl}}{0.5000 \text{ L}} = \boxed{5.000 \frac{\text{g}}{\text{L}}}$$