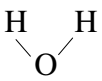
Year 11 Chemistry Test NAME_____

Mixtures and Solutions

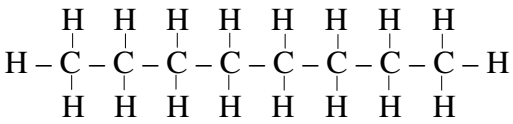
1.

(a) For each compound shown below, state whether it is polar or non-polar:

(i)



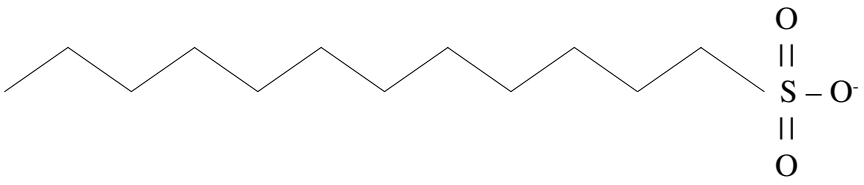
(ii)



_____ _____

(2)

(b) Explain how octane's miscibility in water will be affected by the addition of a detergent such as this:



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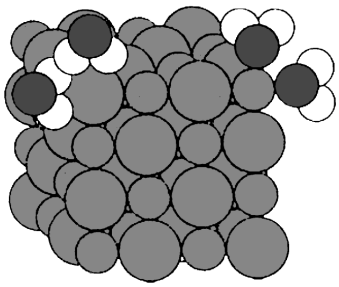
_____ (3)

2. The diagram below shows part of the process of salt (NaCl) dissolving in water.



(a) State the name of the force acting between water and the particles in the salt lattice.

_____ (1)

(b) Dissolving salt involves two steps: dissociation and hydration.
State whether the dissociation step is endothermic or exothermic. Give a reason why in terms of bonds.

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_____ (2)

(c) State whether the hydration step requires or releases energy.

_____ (1)

(d) Use the information in the table below to calculate the enthalpy of solution for NaCl.

ΔH_{LD} (kJ/mol)	$\Delta H_{hydration}$ (kJ/mol)
772	769

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_____ (2)

(e) Write a thermochemical equation to show the dissolving of NaCl in water.

_____ (2)

(f) Calculate the energy released or absorbed if 50 g of NaCl is dissolved in water.
State whether the NaCl absorbed or released the energy.

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_____ (3)

3.

(a) State the precipitate formed when copper sulphate ($CuSO_4$) solution reacts with potassium carbonate (K_2CO_3) solution.

_____ (1)

(b) Hence write the net ionic equation for the reaction of copper sulphate ($CuSO_4$) solution with potassium carbonate (K_2CO_3) solution.

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_____ (2)

4. Magnesium nitrate ($Mg(NO_3)_2$) reacts with sodium hydroxide (NaOH) solution to form sodium nitrate ($NaNO_3$) solution and a precipitate of magnesium hydroxide ($Mg(OH)_2$).

(a) Write a balanced chemical equation for this reaction.

_____ (1)

(b) In preparation for one experiment, 5.0g of magnesium nitrate is dissolved to make 100 mL of solution. Show that the mass concentration of this magnesium nitrate solution is 50 g/L.

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_____ (2)

(c) Calculate the concentration of this magnesium nitrate solution in mol/L.

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_____ (2)

(d) In this experiment, 75 mL of 0.50 mol/L sodium hydroxide exactly reacted with the magnesium nitrate. Calculate the number of moles of sodium hydroxide that reacted.

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_____ (2)

(e) Hence calculate the mass of magnesium hydroxide precipitate formed.

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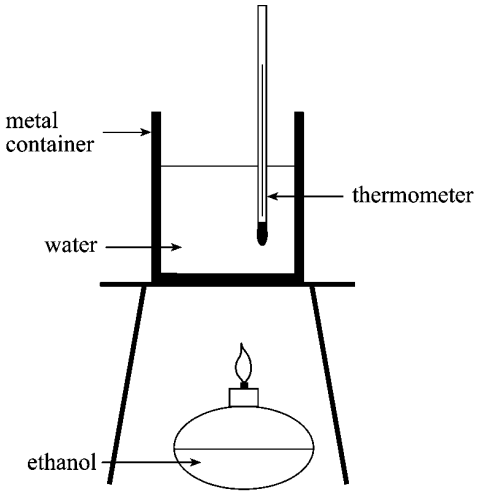
_____ (3)

5. A calorimetry apparatus can be used to determine the heat energy absorbed or released by measuring the temperature change of some substance. In this case the substance used is water, which has a specific heat capacity of c = 4.18 J/g/°C.
   Consider the calorimetry setup below:



(a) Suggest one improvement that could be made to the experimental apparatus, and explain how this would help to increase the accuracy of the result.

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_____ (2)

(b) Use the following data collected in this experiment to calculate the energy released per gram by burning ethanol:

	Mass of spirit burner (g)	**Mass of water (g)**	**Temperature of water (°C)**
Initial	90.2	100 g	10.5
Final	88.7	100 g	46.3

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_____ (3)