

Essential Pre-Uni Chemistry F1.7



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

 $25.0\,\mathrm{cm^3}$ of sulfuric acid at $1.00\,\mathrm{mol\,dm^{-3}}$ and $19.10\,^\circ\mathrm{C}$ is placed in an insulated polystyrene cup. When $25.0\,\mathrm{cm^3}$ of sodium hydroxide at $2.00\,\mathrm{mol\,dm^{-3}}$ and $19.10\,^\circ\mathrm{C}$ is added, the temperature rises to $32.45\,^\circ\mathrm{C}$.

Assuming that no heat is lost, that the specific heat capacity of water may be used, and that the solutions have a density of $1.00\,\mathrm{g\,cm^{-3}}$ at $19.10\,\mathrm{^{\circ}C}$, find the enthalpy change of the reaction per mole of water produced by neutralisation.



Essential Pre-Uni Chemistry F1.6



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

Calculate the enthalpy of combustion of propyne, C_3H_4 , given that complete combustion of $65\,\mathrm{mg}$ of propyne raises the temperature of $800\,\mathrm{g}$ of water from $20.15\,^{\circ}\mathrm{C}$ to $21.09\,^{\circ}\mathrm{C}$.



Essential Pre-Uni Chemistry F1.4



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

The enthalpy change of combustion of decane, $C_{10}H_{22}$, is $-6778\,\mathrm{kJ\,mol^{-1}}$. Calculate the mass required to raise the temperature of $450\,\mathrm{g}$ of water by $80\,^\circ\mathrm{C}$ when burnt completely, with no heat losses from the water. Give your answer to 2 significant figures.



Essential Pre-Uni Chemistry F1.5



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

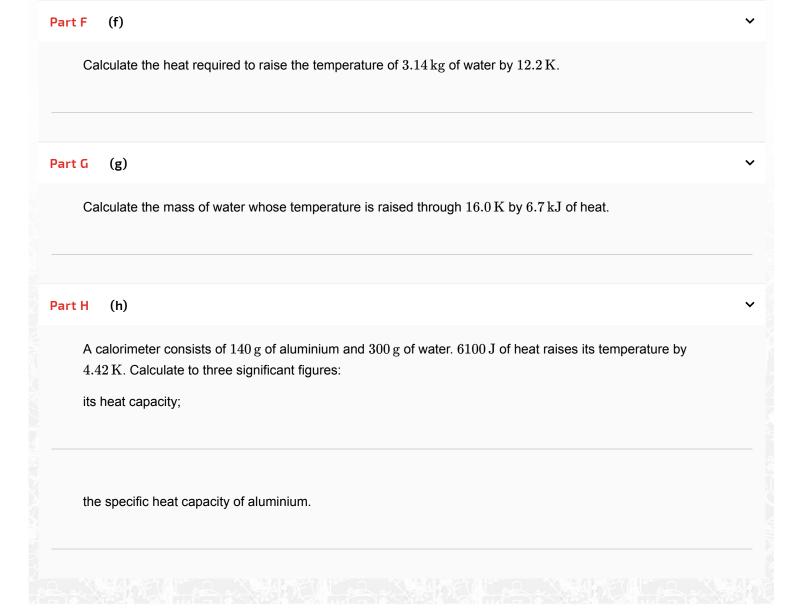
Complete combustion of $0.020\,\mathrm{mol}$ of ethane, with a standard enthalpy of combustion of $-1410.8\,\mathrm{kJ\,mol^{-1}}$ raises the temperature of the water in an insulated calorimeter from $17.4\,^{\circ}\mathrm{C}$ to $22.4\,^{\circ}\mathrm{C}$. Calculate the mass of the water in the calorimeter.



Essential Pre-Uni Chemistry F1.1



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$. Part A (a) Calculate the heat capacity of an object with mass $1.80\,\mathrm{kg}$ and specific heat capacity $0.32\,\mathrm{J\,g^{-1}\,K^{-1}}$. Part B (b) Calculate the heat capacity of a calorimeter if its temperature is raised $2.5\,\mathrm{K}$ by $35\,\mathrm{kJ}$ of heat. Part C (c) Calculate the expected increase in temperature when $2.4\,\mathrm{kJ}$ of heat is transferred to a calorimeter of heat capacity $720\,\mathrm{J\,K^{-1}}$. Part D (d) Calculate the heat required to raise the temperature of a calorimeter of heat capacity $1.6\,\mathrm{kJ}\,\mathrm{K}^{-1}$ by $3.8\,^{\circ}\mathrm{C}$. Part E (e) Calculate the specific heat capacity of a calorimeter if it has a mass of $375\,\mathrm{g}$ and its temperature is raised $4.2\,\mathrm{K}$ by $2160\,\mathrm{J}$ of heat.





Essential Pre-Uni Chemistry F1.3



Specific heat capacity of water $=4.18\,J\,g^{-1}\,K^{-1}.$

The enthalpy change of combustion of naphthalene is $-5156\,\mathrm{kJ\,mol^{-1}}$. Its molar mass is $128.2\,\mathrm{g\,mol^{-1}}$. Calculate the temperature change expected when $1.00\,\mathrm{mmol}$ is burnt in excess oxygen in a calorimeter containing $4.0\,\mathrm{kg}$ of water.



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Essential Pre-Uni Chemistry F1.4

A Level - Practice (P1)

Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

The enthalpy change of combustion of decane, $C_{10}H_{22}$, is $-6778\,\mathrm{kJ\,mol^{-1}}$. Calculate the mass required to raise the temperature of $450\,\mathrm{g}$ of water by $80\,^\circ\mathrm{C}$ when burnt completely, with no heat losses from the water. Give your answer to 2 significant figures.

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Chemistry

Essential Pre-Uni Chemistry F1.1

Essential Pre-Uni Chemistry F1.1

A Level - Challenge (C1)

Specific heat capacity of water $=4.18\mathrm{Jg^{-1}K^{-1}}.$		
Part A (a)		
Calculate the heat capacity of an object with mass $1.80\mathrm{kg}$ and specific heat capacity $0.32\mathrm{Jg^{-1}K^{-1}}$.		
Part B (b) $ \hbox{Calculate the heat capacity of a calorimeter if its temperature is raised $2.5\mathrm{K}$ by $35\mathrm{kJ}$ of heat. } $		
Part C (c) $ \hbox{Calculate the expected increase in temperature when $2.4{\rm kJ}$ of heat is transferred to a calorimeter of heat capacity $720{\rm JK^{-1}}$.} $		
Part D (d) $ \hbox{Calculate the heat required to raise the temperature of a calorimeter of heat capacity $1.6kJK^{-1}$ by $3.8^{\circ}C$. } $		
Part E (e) $ \hbox{Calculate the specific heat capacity of a calorimeter if it has a mass of $375{\rm g}$ and its temperature is raised } 4.2{\rm K}$ by $2160{\rm J}$ of heat. } $		

Part	F (f)
	Calculate the heat required to raise the temperature of $3.14\mathrm{kg}$ of water by $12.2\mathrm{K}$.
Part	G (g)
	Calculate the mass of water whose temperature is raised through $16.0\mathrm{K}$ by $6.7\mathrm{kJ}$ of heat.
Part	H (h)
	A calorimeter consists of $140\mathrm{g}$ of aluminium and $300\mathrm{g}$ of water. $6100\mathrm{J}$ of heat raises its temperature by $4.42\mathrm{K}$. Calculate to three significant figures:
	its heat capacity;
	the specific heat capacity of aluminium.



Home Chemistry

Essential Pre-Uni Chemistry F1.3

Essential Pre-Uni Chemistry F1.3

A Level - Practice (P1)

Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

The enthalpy change of combustion of naphthalene is $-5156\,\mathrm{kJ\,mol^{-1}}$. Its molar mass is $128.2\,\mathrm{g\,mol^{-1}}$. Calculate the temperature change expected when $1.00\,\mathrm{mmol}$ is burnt in excess oxygen in a calorimeter containing $4.0\,\mathrm{kg}$ of water.



Essential Pre-Uni Chemistry F1.10



The enthalpies of combustion of three fuels are shown below:

Fuel	$\Delta H_{\sf c}$ / ${ m kJ}{ m mol}^{-1}$
$\mathrm{CH_4}$	-890.3
$\mathrm{C_{3}H_{8}}$	-2219.2
$\mathrm{C_4H_{10}}$	-2876.5

Part A (a)
Which gives out most heat per gram?

Part B (b)
Which gives out most heat per mole?

Part C (c)
Which gives out most heat per cubic foot?



Essential Pre-Uni Chemistry F1.8



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$

 $30.0\,\mathrm{cm^3}$ of ethanoic acid at $1.60\,\mathrm{mol\,dm^{-3}}$ and $18.65\,^\circ\mathrm{C}$ is placed in an insulated polystyrene cup. When $40.0\,\mathrm{cm^3}$ of sodium hydroxide at $1.00\,\mathrm{mol\,dm^{-3}}$ and $18.65\,^\circ\mathrm{C}$ is added, the temperature rises to $25.80\,^\circ\mathrm{C}$.

Assuming that no heat is lost, that the specific heat capacity of water may be used, and that the solutions have a density of $1.00\,\mathrm{g\,cm^{-3}}$ at $18.65\,^{\circ}\mathrm{C}$, find the enthalpy change of the reaction per mole of water produced by neutralisation.



Essential Pre-Uni Chemistry F1.9

Molar heat loss of ammonium nitrate

Calculate the heat lost per mole of ammonium nitrate.

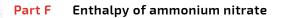
Part E



Specific heat capacity of water $=4.18\,\mathrm{J\,g^{-1}\,K^{-1}}$.

When $5.0\,\mathrm{g}$ of ammonium nitrate dissolves in $100\,\mathrm{g}$ of water, the temperature of the water drops from $18\,^\circ\mathrm{C}$ to $14\,^\circ\mathrm{C}$. Calculate the enthalpy of solution of ammonium nitrate in $kJ\,\mathrm{mol}^{-1}$ using the following scheme.

Empirical formula Part A Write fown the formula of ammonium nitrate. Part B Formula mass Calculate the formula mass of ammonium nitrate. Give your answer to 3 significant figures. Part C Number of moles Calculate the number of moles of ammonium nitrate in $5.0\,\mathrm{g}$. Part D Heat loss of water Calculate the heat lost from the $100\,\mathrm{g}$ of water. Give your answer to 2 significant figures.



Give the enthalpy of solution of ammonium nitrate.