تم تحميل هذا الملف من موقع المناهج الإماراتية

مراجعة القسم الأول Energy الطاقة من وحدة and Energy الكيميائية والتغيرات الطاقة Chemical Change

تاريخ إضافة الملف على موقع المناهج: 2024-09-21 18:15:46

إعداد: SCHOOL ALFAROUQ

التواصل الاجتماعي بحسب الصف الثاني عشر المتقدم

اضغط هنا للحصول على جميع روابط "الصف الثاني عشر المتقدم"

روابط مواد الصف الثاني عشر المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة كيمياء في الفصل الأول

1	مذكرة الوحدة الأولى الطاقة والتغيرات الكيميائية أسئلة الاختبارات الوزارية السابقة
2	تدريبات على الوحدة الأولى الطاقة والتغيرات الكيميائية
3	عرض بوربوينت الوحدة الأولى الطاقة والتغيرات الكيميائية

المزيد من الملفات بحسب الصف الثاني عشر المتقدم والمادة كيمياء في الفصل الأول	
4	عرض بوربوينت درس حالة الاتزان الكيميائي من الوحدة الثانية
5	عرض بوربوينت درس الطاقة والتغيرات الكيميائية

2022 - 2023

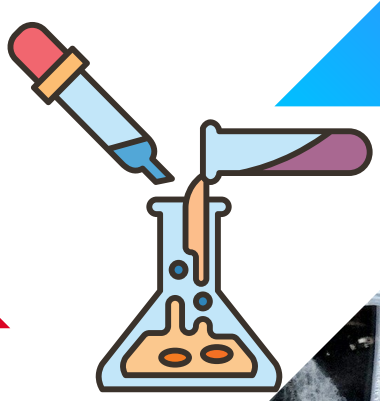
CHEMISTRY

REVISION NOTES

GRADE 12 ADVANCED

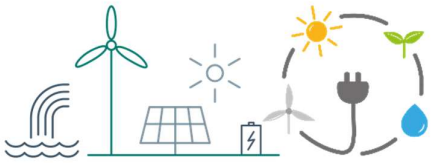
ALFAROUQ SCHOOL

Science Department



Chapter: Energy & Chemical Change

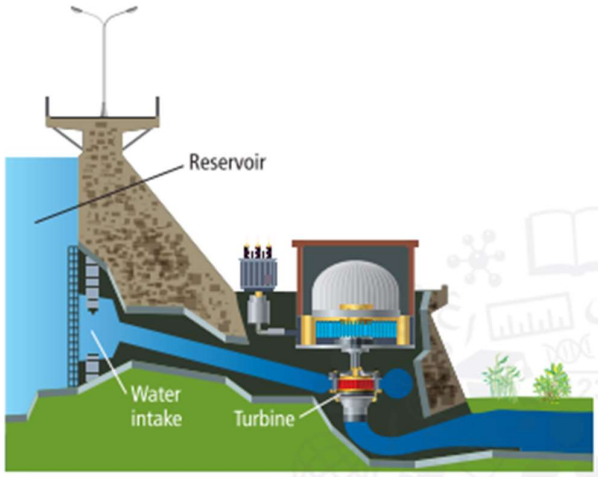
Section (1): Energy



Energy is the ability to do work or produce heat.

Potential Energy is the energy due to the composition or position of an object.

Kinetic Energy is the energy of motion.



PE ⟶ KE ⟶ Electrical Energy

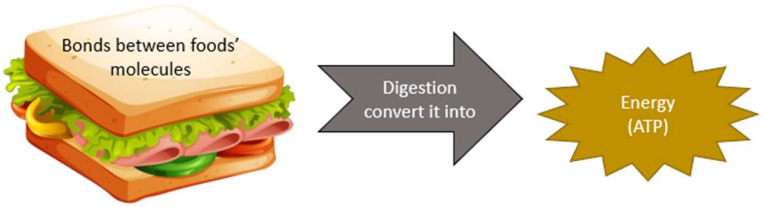
Recall: types of energy
Kinetic (KE) & Potential (PE)

Stored mechanical	PE
Nuclear	PE
Electrical	KE
Light	KE
Chemical	PE
Heat (thermal)	KE
Movement	KE
Gravitational	PE

State the law of conservation of energy.

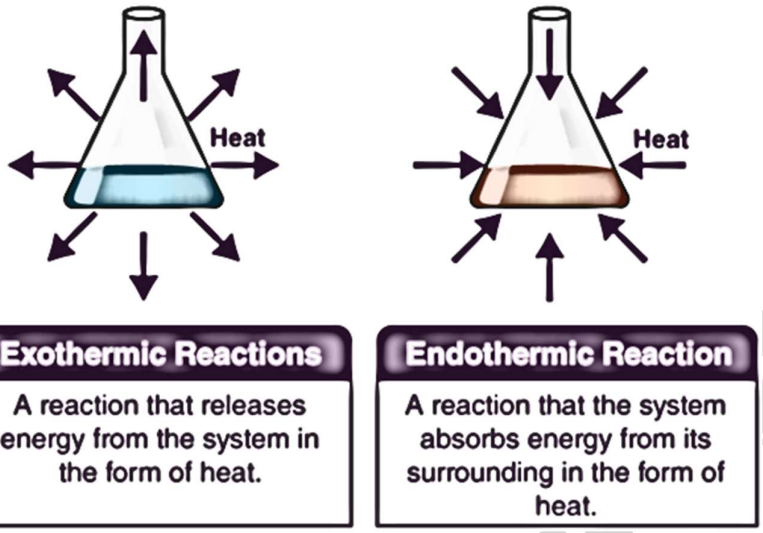
Energy can neither be created nor be destroyed but it can be converted from one form to another_ also known as **the first law of thermodynamics**.

Chemical potential energy ⟶ Heat energy



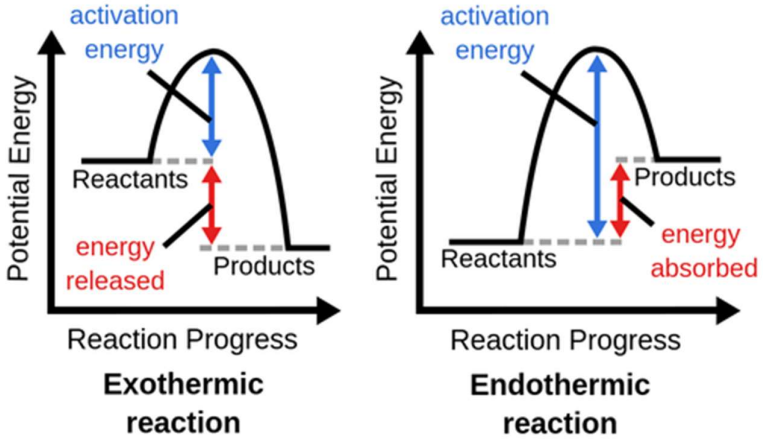
Chemical Potential Energy is the energy that is stored in a substance because of its composition.

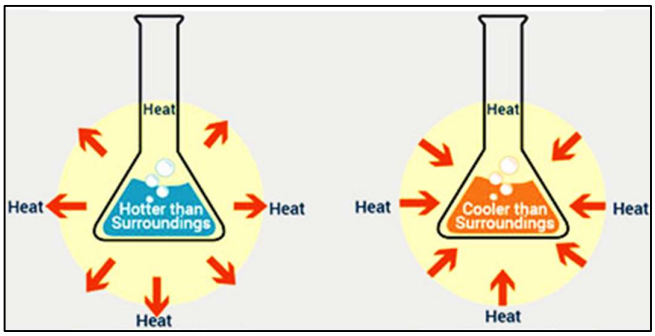
Describe how chemical energy is related to the heat lost or gained in chemical reactions (Exothermic and Endothermic reactions)



In Exothermic Reactions: Chemical potential energy changes to heat, and the heat is released.

In Endothermic Reactions: Heat is absorbed and changed to chemical potential energy.

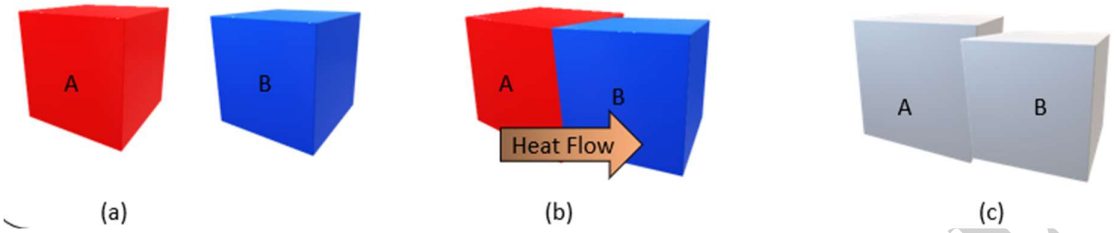




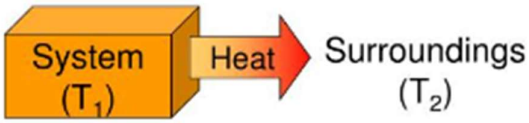
Compare and contrast temperature and heat

TEMPERATURE is a measure of the average kinetic energy of the particles in a sample of matter

HEAT (Q) is energy that is in the process of flowing from a warmer object to a cooler object.



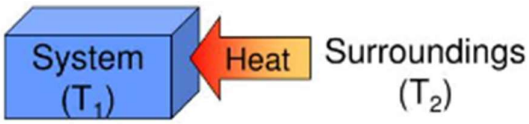
In the graph above two bodies A and B, different temperatures, the temperature of A is higher than that of B.
(b) When they are in contact, heat is transferred from A warmer to B cooler.
(c) Heat transfer will stop when both A and B reach the final temperature.



If $T_1 > T_2$

q_{system} = -

exothermic



If $T_1 < T_2$

q_{system} = +

endothermic

MEASURING HEAT (Q)

- The SI unit of energy and heat is **Joule (J).**
- Bigger unit of Joule is **Kilojoule**
- 1 KJ = 1000J
- In the metric system of unit, **calorie (cal)** is the unit of energy.
- **Calorie** is defined as the amount of energy required to raise the temperature of 1 gram of water by 1°C.
- Bigger unit of calorie is **kilocalorie (Kcal)**
- One **nutritional Calorie** equals 1000 calories, or one kilocalorie (kcal).
- **1 cal = 4.184 J**

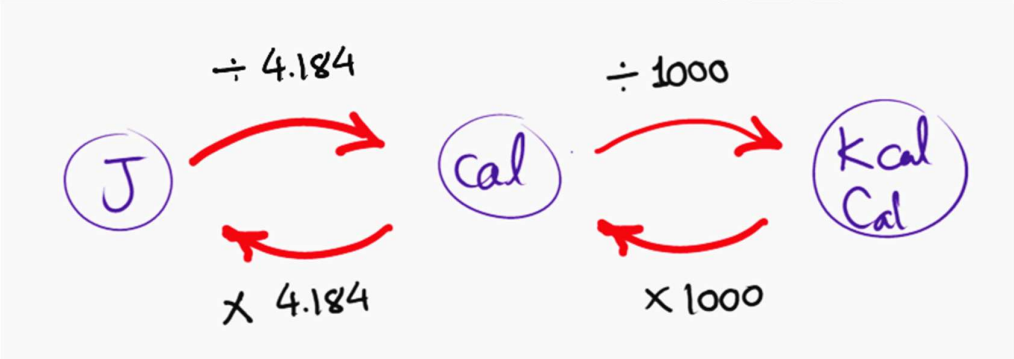
Units of Temperature	Units of Heat
Kelvin (K) Celsius (°C)	Joule (J) calorie (cal) Calorie (Cal)

CALORIE is the amount of heat required to raise the temperature of one gram of pure water one degree Celsius (°C).

JOULE is the SI unit for heat and energy.

Relationships Among Energy Units

Relationship	Conversion Factors
1 J = 0.2390 cal	$\frac{1\ J}{0.2390\ cal}$ $\frac{0.2390\ cal}{1\ J}$
1 cal = 4.184 J	$\frac{1\ cal}{4.184\ J}$ $\frac{4.184\ J}{1\ cal}$
1 Calorie = 1 kcal	$\frac{1\ Calorie}{1000\ cal}$ $\frac{1000\ cal}{1\ Calorie}$



Q. A fruit-and-oatmeal bar contains 142 nutritional Calories.

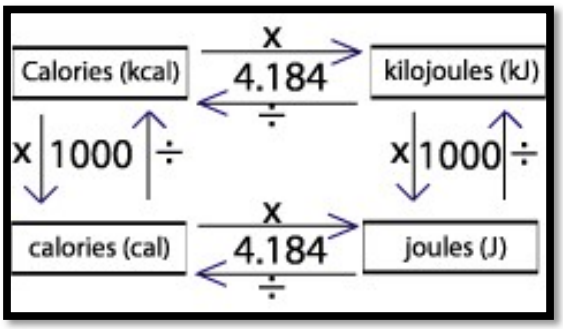
Convert this energy to calories.

142 kcal $\xrightarrow{\times 1000}$ cal

$= 142 \times 10^3$ cal

$\simeq 14.2 \times 10^4$ cal

$\simeq 1.42 \times 10^5$ cal



Q. An exothermic reaction releases 86.5 kJ. How many kilocalories of energy are released?

$$86.5\ \cancel{kJ} \times \frac{1\ kcal}{4.184\ \cancel{kJ}} = 20.7\ kcal$$

SPECIFIC HEAT (c)

It's the amount of heat required to raise the temperature of one gram (1 g) of that substance by one degree Celsius (1 °C).

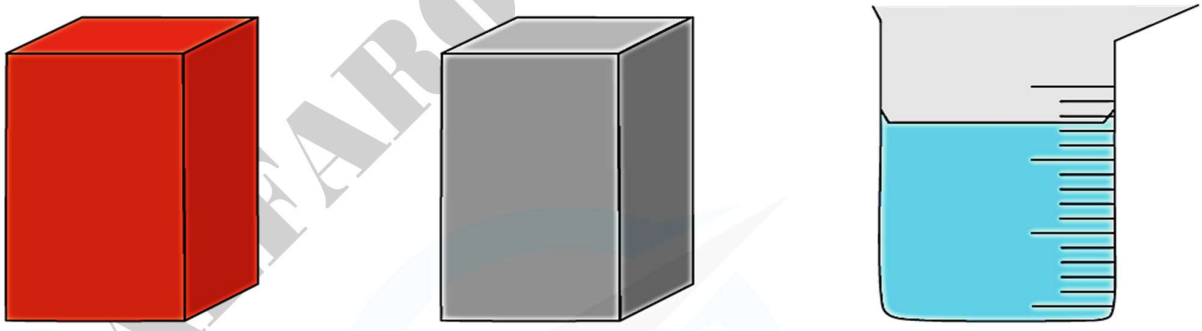
- It is a **physical property** that can be used to help identify the substance.
- Since **different substances have different compositions, each substance has its own specific heat capacity**.

(Q) How would the temperature change of the concrete compare to that of the water on a hot summer day?

The water is cooler because water must absorb five times the number of joules as concrete to reach an equivalent temperature.

Specific Heats at 298 K (25°C)

Substance	Specific heat J/(g•°C)
Water(l)	4.184
Ethanol(l)	2.44
Water(s)	2.03
Water(g)	2.01
Beryllium(s)	1.825
Magnesium(s)	1.023
Aluminum(s)	0.897
Concrete(s)	0.84
Granite(s)	0.803
Calcium(s)	0.647
Iron(s)	0.449
Strontium(s)	0.301
Silver(s)	0.235
Barium(s)	0.204
Lead(s)	0.129
Gold(s)	0.129



COPPER BLOCK

SPECIFIC HEAT CAPACITY OF COPPER = 390 J/kg°C

ALUMINIUM BLOCK

SPECIFIC HEAT CAPACITY OF ALUMINIUM = 910 J/kg°C

WATER

SPECIFIC HEAT CAPACITY OF WATER = 4200 J/kg°C

LOWER SPECIFIC HEAT CAPACITY – WARMS UP AND COOLS DOWN QUICKLY AS IT TAKES MUCH LESS ENERGY TO CHANGE ITS TEMPERATURE

HIGHER SPECIFIC HEAT CAPACITY – WARMS UP AND COOLS DOWN SLOWLY AS IT TAKES MUCH MORE ENERGY TO CHANGE ITS TEMPERATURE

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$$q = m \cdot C \cdot \Delta T$$

q = heat or enthalpy	J
m = mass	g
C = specific heat	J/g°C
Δ T = temperature change	°C

$q_{sys} = - q_{surr}$

Examples:

If the temperature of 34.4 g of ethanol increases from 25.0°C to 78.8°C, how much heat has been absorbed by the ethanol? Refer to **Table 2.**

$$q = c \times m \times \Delta T$$

$$q = 2.44\ \text{J/(g} \cdot ^\circ\text{C)} \times 34.4\ \text{g} \times 53.8^\circ\text{C}$$

$$= 4.52 \times 10^3\ \text{J}$$

A 155-g sample of an unknown substance was heated from 25.0°C to 40.0°C. In the process, the substance absorbed 5696 J of energy. What is the specific heat of the substance? Identify the substance among those listed in **Table 2**.

$$q = c \times m \times \Delta T$$

$$c = \frac{q}{m\Delta T} = \frac{(5696\ \text{J})}{(155\ \text{g})(40.0 - 25.0^\circ\text{C})} = 2.45\ \text{J/(g} \cdot ^\circ\text{C)}$$

The specific heat is very close to the value for ethanol.

A 4.50-g nugget of pure gold absorbed 276 J of heat. The initial temperature was 25.0°C. What was the final temperature?

$$q = c \times m \times \Delta T$$

$$\Delta T = \frac{q}{cm} = \frac{(276\ \text{J})}{(0.129\ \text{J/g} \cdot ^\circ\text{C})(4.50\ \text{g})} = 475^\circ\text{C}$$

$$\Delta T = T_f - T_i = T_f - 25.0^\circ\text{C} = 475^\circ\text{C}$$

$$T_f = 5.00 \times 10^2{}^\circ\text{C}$$

$$K = {}^\circ C + 273$$

$$^\circ C = K - 273$$

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EXERCISE

1-A 90.0 g sample of an unknown metal absorbed 25.6 J of heat as its temperature increased 1.18 C° what is the specific heat of the metal ?

2-the temperature of a sample of water increases from 20.0 C° to 46.6 C° as it absorbs 5650 J of heat .what is the mass of the sample ?

3-how much heat is absorbed by a $2.00 \times 10^3\ g$ granite boulder ($C_{granite}$ = 0.803 $J/(g.\ C°)$ as its temperature changes from 10.0 C° to 29.0 C° ?

4- if the temperature of 34.4 g of ethanol increases from 25.0 C° to 78.8 C° how much heat has been absorbed by the ethanol ? $C_{ethanol}$ = 2.44 $J/(g.\ C°)$

5-a 155 g sample of an unknown substance was heated from 25.0 C° to 40.0 C° in the process , the substance absorbed 5696 J of energy , what is the specific heat of the substance ? identify the substance ?

6- 4.50 g nugget of pure gold absorbed 276 J of heat the initial temperature was 25.0 C° what was the final temperature ?

7- the temperature of a sample of iron with a mass of 10.0 g changed from 50.4 C° to 25.0 C° with the release of 114 J. what is the specific heat of iron ?

8-if 335 g of water at 65.5 C° loses 9750 J of heat , what is the final temperature ?

9- calculate the amount of heat absorbed by 5.00×10^3 g block of concrete sidewalk if temperature increased by 6.0°C $C_{concrete}$ = 0.84 $J/(g.\ C°)$ and compare the absorbed heat by water if water has the same mass ?

10- calculate the amount of heat absorbed when 5.5 g of aluminum is heated from 25.0 °C to 95 °C The specific heat of aluminum is 0.897 $J/(g.\ °C)$

11- equal masses of Al , Au(gold) , iron (Fe) ,Ag(silver) were left to site in the sun at the same time and for the length of time , arrange the four metals according to the increase in their temperature.

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