
FORMULAE

$$Q_{\text{new}} = \frac{Q_1 + Q_2}{2}$$

$$\text{no of } e^- \text{ transferred} = \frac{Q \text{ transferred}}{\text{charge on 1 electron}}$$

$$Q \text{ transferred} = Q_{\text{final}} - Q_{\text{initial}}$$

$$F = \frac{k \times Q_1 \times Q_2}{r^2}$$

CONSTANTS

Charge on an electron	$-1,6 \times 10^{-19} \text{ C}$
Charge on a proton	$1.6 \times 10^{-19} \text{ C}$
Coulombs Constant (k)	$9 \times 10^9 \text{ N.m}^2.\text{C}^{-2}$

INSTRUCTIONS

This test is divided into 2 sections:

Section A : Chemical change Section B : Electrostatics (xx)

Write all numbers with a **comma** eg 0,71

Do not leave spaces between the number and the unit eg 0,71Hz

If there are two steps to a calculation there will be two blocks provided. Fill in the answers in the correct order.

Round final answers off to two decimal places where necessary

When answers are very small or very big, write in scientific notation and still round off to **two decimal places**.

SECTION A : CHEMICAL CHANGE

(32)

QUESTION 1 : NAMES TO FORMULAE

[10]

Write the chemical formulae for the following compounds

1.1 ammonia

1.2 ammonium dichromate

1.3 potassium permanganate

1.4 barium chloride

1.5 sodium sulphite

1.6 silver iodide

1.7 copper (II) carbonate

1.8 calcium sulphate

1.9 methane

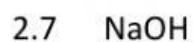
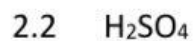
1.10 manganese (VII) hydroxide

QUESTION 2 : FORMULAE TO NAMES

[10]

Write the chemical names (**using stock notation where necessary**) for the following compounds

2.1 H_2S

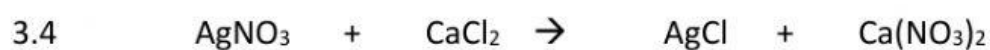


QUESTION 3 : BALANCING EQUATIONS

[12]

Place a co-efficient into the blocks in front of the compounds in order to balance the equations.

If no number is required then place a number 1 in the block



QUESTION 4 : CONSTRUCTING A BALANCED EQUATION**[11]**

Write the following chemical changes as balanced equations

Place the formulae for the chemicals into the box.

Place a co-efficient into the circle in front of the box in order to balance the equation.

If no number is required then place a number 1 in the block

4.1 Hydrogen gas burns in oxygen gas to produce water vapour. (3)



4.2 iron (III) oxide reacts with carbon monoxide to produce iron and carbon dioxide. (4)



4.3 Aspartame, (an artificial sweetener) has the formula $C_{14}H_{18}N_2O_5$.
Write a balanced for its combustion in oxygen gas to form carbon dioxide gas, water and nitrogen gas. (4)



SECTION B : ELECTROSTATICS**(43)****QUESTION 5 :****[4]**

5.1 When a glass rod is rubbed in a silk cloth, the silk cloth gains /loses electrons and the glass rod becomes positively / negatively charged.

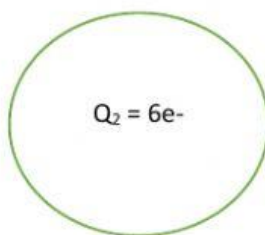
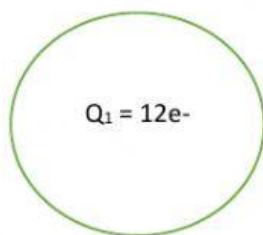
5.2 A physical quantity such as charge can be divided into smaller and smaller quantities. When that smallest quantity can no longer be divided, we say that the charge has been

5.3 Charge cannot be created or destroyed but only transferred from one object to another. We call this the **Law of** **of Charge.**

QUESTION 6

6.1 Two charged spheres Q_1 and Q_2 have an excess of electrons.

Q_1 has 12 extra electrons and Q_2 has 6 extra electrons



The spheres are brought together and allowed to separate again.

Calculate the charge on each sphere

And then the new charge on the spheres after they touch

{enter answers as follows: 6,32 x 10 -14 C}

Answer,
with 2 deci

Exponent

unit

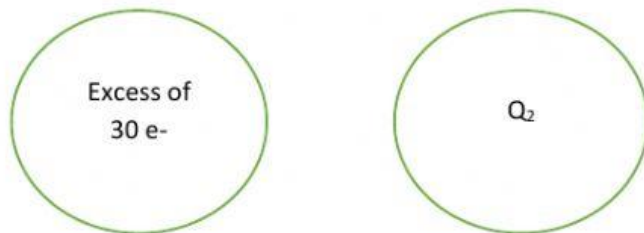
$Q_1 =$ x 10

$Q_2 =$ x 10

$Q_{\text{new}} =$ x 10

6.2 Two charged spheres Q_1 and Q_2 have an excess/shortage of electrons.

Q_1 has 30 extra electrons and the charge on Q_2 is unknown.



The spheres are brought together and allowed to separate again.

The new charge on each sphere shows an excess of 10 e^-

Calculate the charge on $Q_1 = \underline{\hspace{1cm}} \times 10 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$

Calculate the new charge on each sphere after they touched

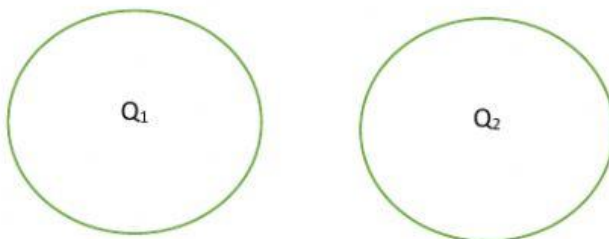
$= \underline{\hspace{1cm}} \times 10 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$

Calculate the initial charge on Q_2 .

$Q_2 = \underline{\hspace{1cm}} \times 10 \underline{\hspace{1cm}} \underline{\hspace{1cm}}$

QUESTION 7

7.1 Two spheres have charges as follows Q_1 has a charge of $2,5 \times 10^{-6}\text{C}$ while Q_2 has a charge of $-4 \times 10\text{ nC}$



The spheres are brought together and allowed to separate again.

7.1.1 Do electrons transfer from Q_1 to Q_2 or from Q_2 to Q_1 ?

7.1.2 Calculate the new charge on the spheres.

$$Q_{\text{new}} = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} \underline{\hspace{1cm}}$$

7.1.3 Calculate the charge that was transferred during the process

$$Q_{\text{transferred}} = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} \underline{\hspace{1cm}}$$

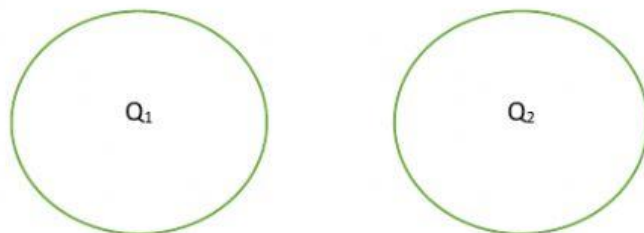
7.1.4 Calculate the number of electrons that were transferred during the process.

$$\text{no of } e^- \text{ transferred} = \frac{Q_{\text{transferred}}}{\text{charge on 1 electron}}$$

$$\text{no of } e^- \text{ transferred} = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} e^-$$

7.2 Two charged spheres Q_1 and Q_2 have an excess/shortage of electrons.

Q_1 has a charge of $3 \times 10^{-6}\text{C}$ while the charge on Q_2 is unknown.



The spheres are brought together and allowed to separate again.

The new charge on each sphere is now $5,5 \times 10^{-6}\text{C}$.

7.2.1 Calculate the initial charge on Q_2 .

$$Q_2 = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} \underline{\hspace{1cm}}$$

7.2.2 Calculate the charge that was transferred during the process.

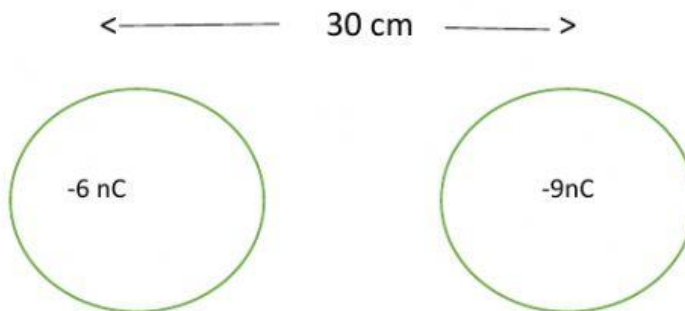
$$Q_{\text{transferred}} = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} \underline{\hspace{1cm}}$$

7.2.3 Calculate the number of electrons that were transferred during the process.

$$\text{no of } e^- \text{ transferred} = \underline{\hspace{1cm}} \times 10^{\underline{\hspace{1cm}}} e^-$$

7.2.4 How many coulombs of electrons does your answer in 7.2.3 represent? = ____ x 10 ____

8.1

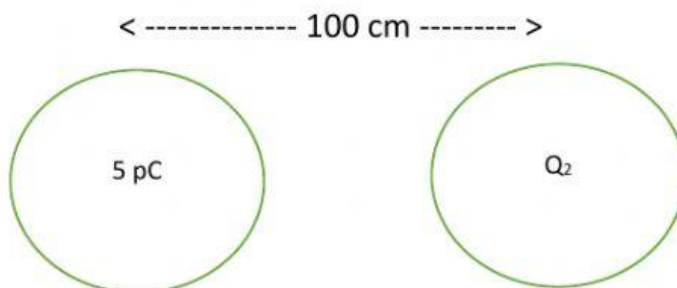


Two charged spheres are positioned 30 cm apart from their centres. Calculate the electrostatic force of attraction between them.

$$F = \frac{k \times Q_1 \times Q_2}{r^2}$$

$$F = \text{ ____ } \times 10 \text{ ____}$$

8.2



Two positively charged spheres are placed 100 cm apart from their centres.

The Q_1 , sphere on the left carries a charge of 5pC while the charge on Q_2 , the sphere on the right is unknown. The force between them is 150 N.

Calculate the size of the unknown charge on the right.

$$F = \frac{k \times Q_1 \times Q_2}{r^2}$$

$$k \times Q_1 \times Q_2 = Fr^2$$

$$Q_2 = \frac{\square \square}{\square \square}$$

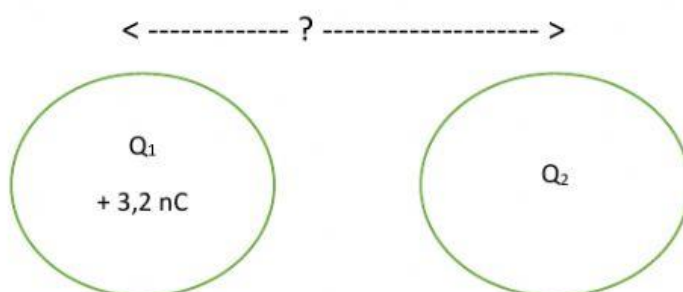
(change the subject of the formula- only

substitute the symbols in the above equation,
not actual values)

$$Q_2 = \text{ ______ } \times 10 \text{ ______ } \text{ ______ }$$

QUESTION 9

Two identically charged spheres are situated at an unknown distance apart.



There is an electrostatic force of $2,30 \times 10^{-6}$ N between them.

9.1.1 Is the force between them one of attraction or repulsion?

9.1.2 Calculate the distance between the spheres (in metres).

$$F = \frac{k \times Q_1 \times Q_2}{r^2}$$

$$Fr^2 = k \times Q_1 \times Q_2$$

$$r = \sqrt{\frac{\square \square}{\square \square}}$$

(change the subject of the formula)

$$r = \text{ ______ } \times 10 \text{ ______ } \text{ ______ }$$