**For all calculation questions, whether it be Physics, Chemistry or Biology ALWAYS show your working. You need to:**

* **Write the equation/s you are using.**
* **Rearrange if necessary.**
* **Make sure the units are in scientific format (e.g. m not cm) and if not convert them.**
* **Substitute the numbers.**
* **Complete the calculation.**
* **If needed add the units.**

**Q1.**

A teacher used the equipment shown in the figure below to demonstrate the motor effect.



The copper rod in the figure above has a length of 7 cm and a mass of 4 ×10–4 kg.

When there is a current of 1.12 A the resultant force on the copper rod is 0 N.

Calculate the magnetic flux density.

Gravitational field strength = 9.8 N / kg

**Weight (Force) = mass x gravitational field strength W = mg**

1 mark

**W = 4 ×10–4 kg x 9.8 N / kg = 3.92 × 10–3**

**Force = magnetic flux edacity x current x length F = BIl**

**7cm = 0.07m**

1 mark

**F = BIl B = F ÷ Il**

1 mark

**B = 3.92 × 10–3 / (1.12 x 0.07) B = 3.92 × 10–3 / 0.0784**

1 mark

**B = 0.05 (T)**

1 mark

1 mark

Magnetic flux density = \_\_\_\_\_\_**0.05 T**

**(6)**

**Q2.**

The salt copper sulfate can be made by reacting copper carbonate with dilute sulfuric acid.

CuCO3(s)   +   H2SO4(aq)      CuSO4 (aq)   +   H2O(l)   +   CO2(g)

Calculate the **number of molecules** in 14 g of carbon dioxide.

Give your answer in standard form.

Relative atomic masses (*Ar*): C = 14; O = 16

**1 mole carbon dioxide = 14 + (16 × 2) = 46 g**

1 mark

**14 ÷ 46 = 0.030434 so 14 g is 0.30 mole**

1 mark

**1 mole is 6.02 × 1023 molecules**

1 mark

**14 g has 0.30 x 6.02 × 1023 so 14g has 1.81 × 1023 molecules**

1 mark

Answer = \_\_\_\_\_**1.81 × 1023** \_\_\_\_ molecules

**(4)**

**When completing a question that asks for a comparison or an evaluation between two or more things make sure you actually compare the things in the question. Don’t just write about one of them and ignore the other. Also make sure you CLEARLY state how they are different.**

**Q1.**

Meiosis and mitosis are different types of division in human cells. Compare the two processes by referring to where each takes place and the kind of products that are made.

**For a question like this you will be awarded marks for clear comparisons. For this draw a table.**

|  |  |  |
| --- | --- | --- |
|  | **Meiosis** | **Mitosis** |
| **Type of reproduction** | **sexual** | **asexual** |
| **Type of cells produced** | **gametes** | **growth** |
| **Where division takes place** | **ovary *or* testes *or* gonads** | **all other cells** |
| **How many chromosomes** | **half number *or* 23**  | **same number *or* 46**  |
|  | **haploid** | **diploid** |
|  | **not identical** | **identical** |
| **Number of cells produced** | **4 cells** | **2 cells** |
| **Number of divisions** | **2 divisions** | **1 division** |

 **(Total 6 marks)**