

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Mark Schemes

Q1.

- (a) Electrons collide with atoms. ✓

Electron in an atom is excited into a higher energy level. ✓

Emits a photon when the electron relaxes / moves to lower energy level. ✓

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- (b) Substitutes in
- $eV = \frac{1}{2}mv^2$
- ✓

Manipulates and gives answer to 2 or more sfs. ✓

2

- (c) Deduces
- $e/m = v/Br$
- . ✓

Substitutes data (condone power of 10 errors). ✓

$$\frac{e}{m} = \frac{3.0 \times 10^7}{3.1 \times 10^{-3} \times 5.7 \times 10^{-2}}$$

$$1.7 \times 10^{11} \text{ (C kg}^{-1}\text{)}. \checkmark$$

Substitution may come before manipulation.

3

- (d) Electron velocity decreases when they collide. ✓

 v is proportional to r **OR** $r = vm/Be$ and m , B and e are constant. ✓ r (gradually) decreases

or path will be an inwards spiral. ✓

3

[11]**Q2.**

- (a) The observed and prediction using classical physics do not agree for short wavelengths. ✓

This disagreement is in the ultraviolet part of the spectrum. ✓

2

- (b) In classical physics radiation is emitted as a continuous wave. ✓

Planck proposed that energy is emitted in discrete amounts quanta.

or

Proposed that the energy of a quantum is hf where f is the frequency of the radiation. ✓

2

- (c) To remove electron from a surface requires a particular amount of energy / mention of work function. ✓

In classical physics the energy arrives continuously so all frequencies should liberate electrons. ✓

In practice, electrons are liberated only when frequency exceeds threshold (value) OWTTE. ✓

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[7]