

## UNIT 6 - RADIOACTIVITY AND NUCLEAR CHEMISTRY

### 6.2 CLASS WORKSHEET - PROPERTIES OF RADIATION AND RADIOACTIVE ISOTOPES

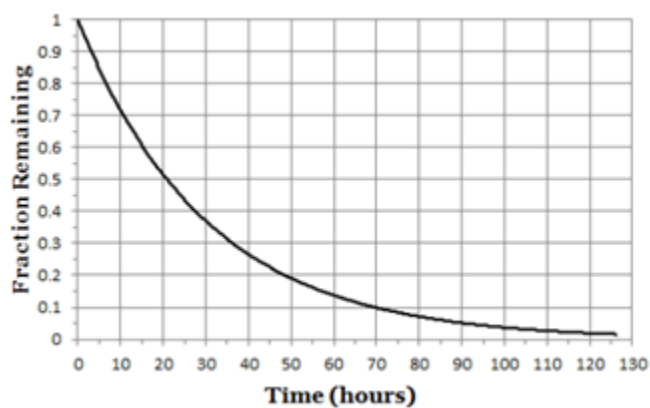
#### 1. Ionizing and penetrating power of radiation

Complete the following table by adding the words “high”, “medium” or “low”

| Type of Radiation | Ionizing Power | Penetrating Power |
|-------------------|----------------|-------------------|
| alpha             | high           | low               |
| Beta              | medium         | medium            |
| gamma             | low            | high              |

#### 2. Calculating and using half-lives

- (a) Magnesium-28 is radioactive. A sample of magnesium-28 was monitored over several days and its rate of decay is shown in the graph below:



- (ii) Use the graph above to note the time taken for:

|                            | Time     |
|----------------------------|----------|
| 50% of the sample to decay | 20 hours |
| 75% of the sample to decay | 40 hours |

- (iii) Hence estimate the half-life of magnesium-28

20 hours

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|     |      |  |
|-----|------|--|
| (b) | (i)  | Uranium-238 has a half-life of 160,000 years.<br>Marcus has 2000 atoms of uranium-238.   |
|     | (α)  | How many uranium-238 atoms will he have after 640,000 years?   |
|     |      | 640,000 years is $640,000/160,000 = 4$ half-lives<br>1 hl → 2 hl → 3 hl → 4 hl<br>2000 → 1000 → 500 → 250 → 125 so he will have <b>125 atoms</b>   |
|     | (ii) | Janika has some radium-224. It is radioactive.<br>She notices that after 14.5 days her sample is emitting radiation at 6.25% of its original rate.<br>What is the half-life of radium-224? |
|     |      | 1 hl = 50%, 2hl = 25%, 3hl = 12.5%, 4 hl = 6.25% so four half lives = 14.5 days<br>So one half-live = $14.5/4 = 3.625$ days  |