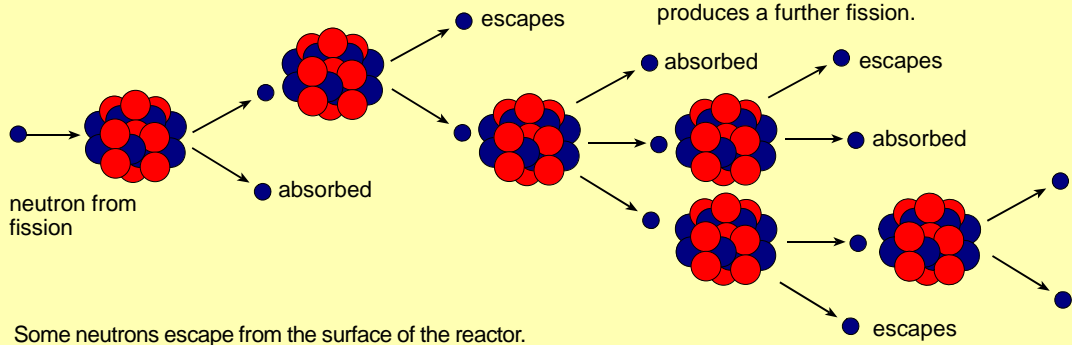


# TAP 527- 3: Chain reactions

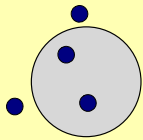
## Chain reaction and critical mass

### Critical chain reaction



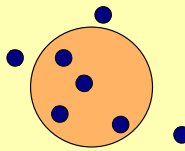
Some neutrons escape from the surface of the reactor. Other neutrons are absorbed without causing fission.

### Sub-critical mass



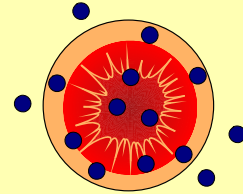
all chains die out as neutrons are absorbed or escape

### Critical mass



one new fission follows each fission, on average. Reaction goes at steady rate

### Super-critical mass



several new fissions follow each fission: reaction grows rapidly

Rate of escape of neutrons  $\propto$  surface area  
 Rate of production of neutrons  $\propto$  volume

ratio  $\frac{\text{volume}}{\text{surface area}}$  increases with size

**Practical advice**

These diagrams are reproduced here so that you can use them for discussion with your class.

**External reference**

This activity is taken from Advancing Physics chapter 18, 1200