Blackline Masters

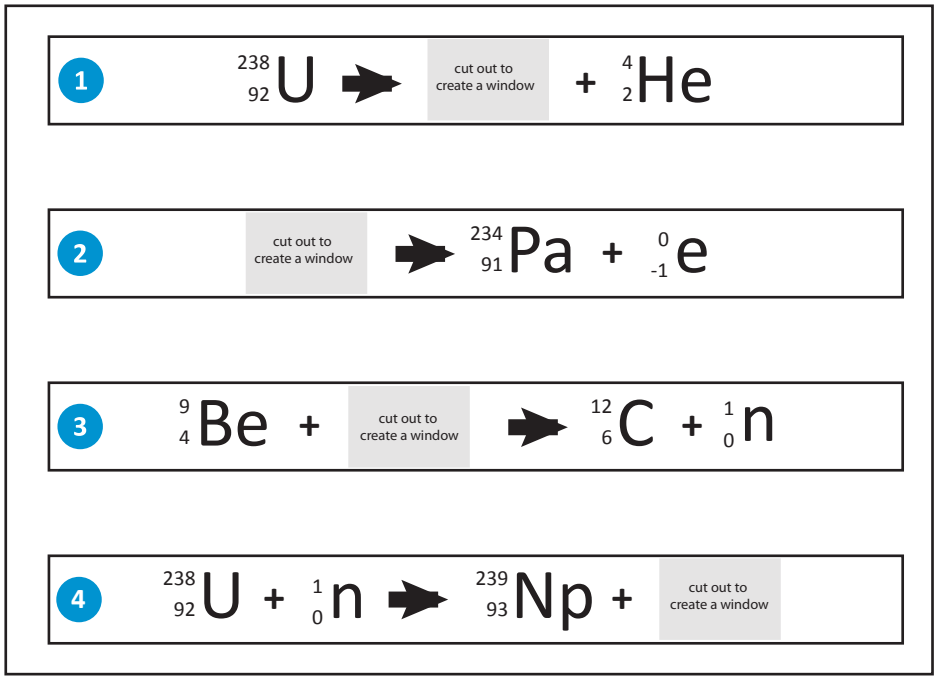
for

Atomic Structure and Nuclear Chemistry

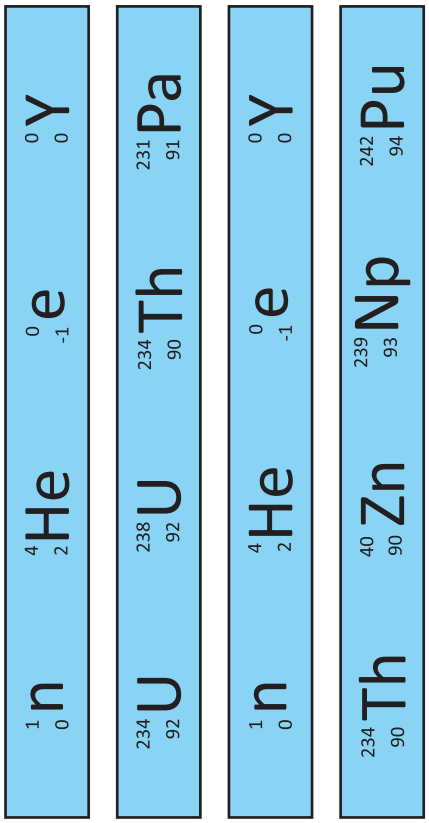
Nuclear Equations and Radioactive Decay

Contents

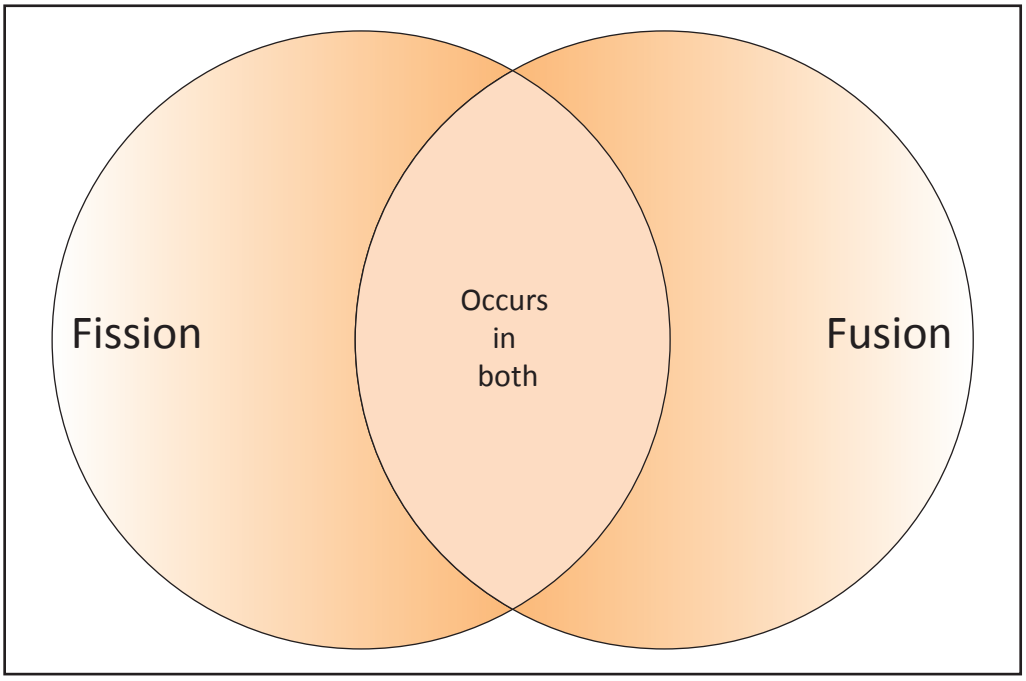
Station Information Sheet
Nuclear Equations and Radioactive Decay



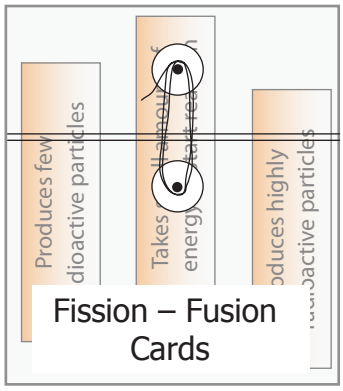
Nuclear Equations Card



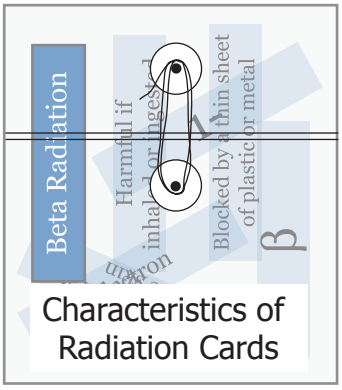
Nuclear Equations Strips



Fission – Fusion Venn Diagram

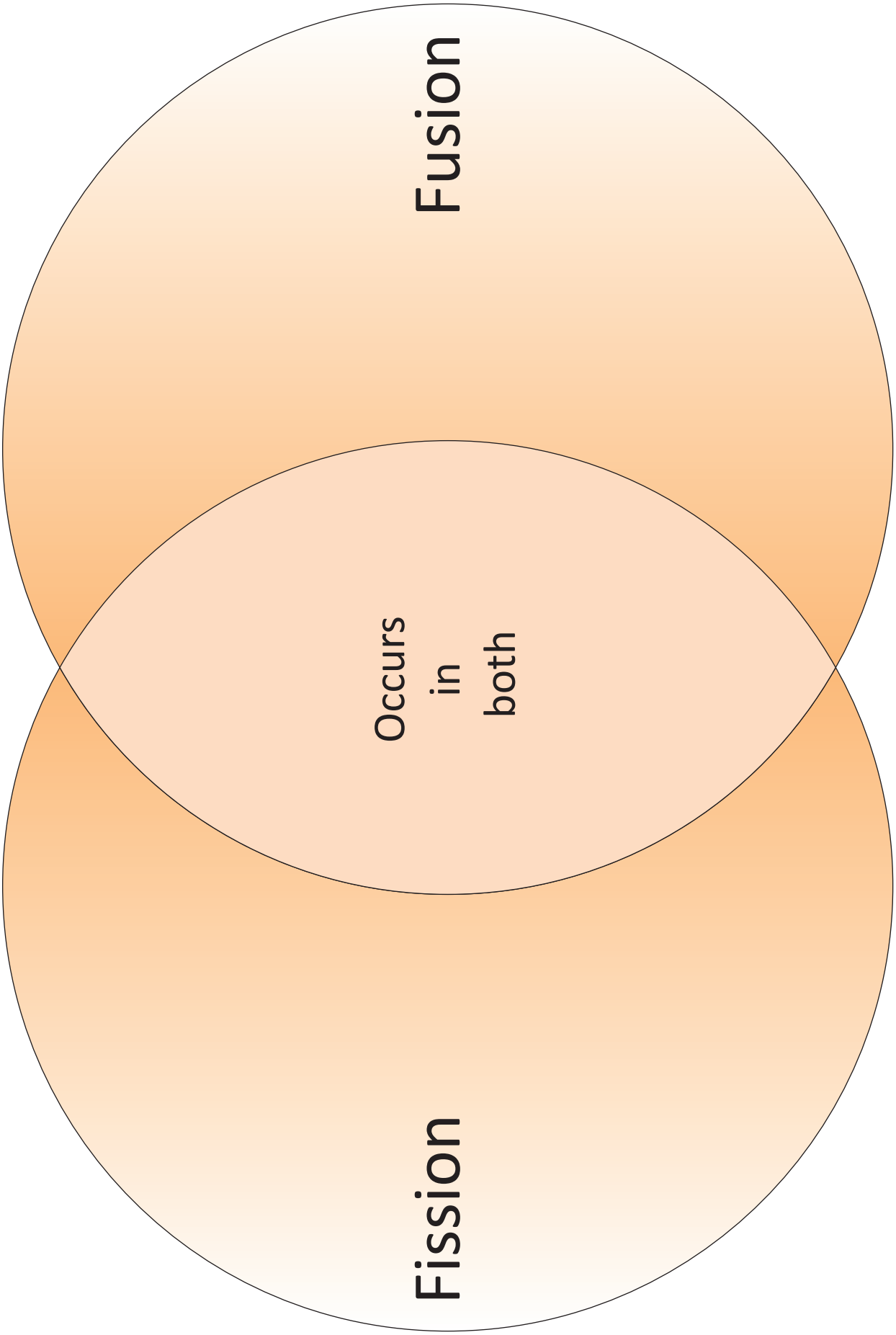


Fission – Fusion Cards



Characteristics of Radiation Cards

Alpha Radiation	Beta Radiation	Gamma Radiation
α	β	γ
helium nucleus	high energy electron	high energy photons
2+	1-	0
$^{4}_{2}He$	$^{0}_{-1}e$	$^{0}_{0}\gamma$
Cannot penetrate the skin		
Harmful if inhaled or ingested	Harmful if inhaled or ingested	Exposure to the body is dangerous
Blocked by a sheet of paper	Blocked by a thin sheet of plastic or metal	Blocked by very dense materials like lead


Fusion
Occurs in both
Fission

Reactions release large amounts of energy

Splitting of nucleus into smaller nuclei

Takes small amount of energy to start reaction

Used to generate electricity in nuclear power plants

Does not occur in nature often

Produces highly radioactive particles

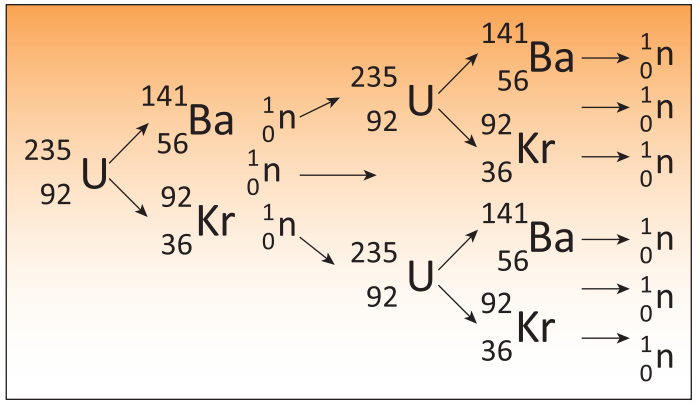
Smaller nuclei combine to form larger nucleus

Occurs in stars like our sun

Produces few radioactive particles

Takes large amounts of energy to start a reaction

$$ {}^{2}_{1}\mathrm{H} + {}^{3}_{1}\mathrm{H} \longrightarrow {}^{4}_{2}\mathrm{He} + {}^{1}_{0}\mathrm{n} $$



$^{234}_{90}Th$	$^{40}_{90}Zn$	$^{239}_{93}Np$	$^{242}_{94}Pu$
$^{234}_{92}U$	$^{238}_{92}U$	$^{234}_{90}Th$	$^{231}_{91}Pa$
$^{1}_{0}n$	$^{4}_{2}He$	$^{0}_{-1}e$	$^{0}_{0}Y$
$^{1}_{0}n$	$^{4}_{2}He$	$^{0}_{-1}e$	$^{0}_{0}Y$

1

$$^{238}_{92}U \longrightarrow \text{cut out to create a window} + {}^{4}_{2}He$$

2

$$\text{cut out to create a window} \longrightarrow {}^{234}_{91}Pa + {}^{0}_{-1}e$$

3

$${}^{9}_{4}Be + \text{cut out to create a window} \longrightarrow {}^{12}_{6}C + {}^{1}_{0}n$$

4

$${}^{238}_{92}U + {}^{1}_{0}n \longrightarrow {}^{239}_{93}Np + \text{cut out to create a window}$$