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SAMPLE CALCULATION - GVR VALUES
FOR DETERMINING TRITIUM SEPARATIONS COSTS

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R. Nilson, Manager
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SAMPLE CALCULATION - GVR VALUES
FOR DETERMINING TRITIUM SEPARATIONS COSTS

Definition : $GVR = \frac{\text{Total Gas Volume}}{\text{Target Volume}}$

Consider the K-Reactor cores after 1" overbore with a 2.1 E - $LiAlO_2$ loading.
CAGE results show 20.0 tons of target yielding 11.47 kgs of tritium.

$$\frac{(11.47)(1000) \text{ grams}}{6 \text{ grams/mol}} = 1957 \text{ mols}$$

$$(1957)(22.4 \text{ l/mol})(0.0353 \text{ ft}^3/\text{l.}) = 1547 \text{ ft}^3 \text{ tritium.}$$

But Richland column feed from $LiAlO_2$ targets is 80% tritium and 20% protium.

Also, since $Li^6 + n \rightarrow T^3 + He^4$, and T^3 is diatomic, there are two volumes of helium for each volume of tritium.

$$\text{Therefore, Total Gas} = \underset{(T_2)}{1547 \text{ ft}^3} + \left(\frac{1547}{.5} - 1547 \right) \underset{(He)}{+ (2)(1547)} = 5028 \text{ ft}^3$$

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This gas is contained in 20.0 tons or 312.5 ft³ of aluminate target (128 pounds per cubic foot).

$$\text{Therefore, GVR} = \frac{\text{Total Gas Volume}}{\text{Target Volume}} = \frac{5028}{312.5} = 16.1$$

R. W. Bown

R. W. Bown, Senior Engineer
Advanced Concepts and Planning

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