

Moderator & Moderator System

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1 Quiz

1.1 Questions

1. Which one of the following is most suitable for use as moderator?
(a) water (b) helium (c) steel (d) nickel
2. Define moderating ratio.
3. Why is the core of PHWR larger than that of an equivalent PWR or BWR?
4. Determine the number of collisions required to reduce the neutron energy by 1.5×10^6 times using water as moderator. The value of ξ for water is 0.92.
5. Determine the moderating ratio for light water using the following data: $\xi = 0.92$; $\sigma_{el} = 25$ b; $\sigma_c = 0.33$ b.
6. What is the purpose of moderator system?
7. Mention the important components of moderator system

1.2 Answers

1. (a) water

2.
$$\frac{\xi \sigma_{el}}{\sigma_c}$$

3. PHWR uses heavy water as moderator. The number of collisions required for thermalization in heavy water is more than that required for light water. Hence a larger core is required to ensure sufficient number of collisions.

4.

$$\exp(n \xi) = 1.5 \times 10^6$$

$$\exp(n \cdot 0.92) = 1.5 \times 10^6$$

Therefore,

$$'n' = 15.45 \sim 16$$

Number of collisions required is 16

5. Moderating ratio = $\frac{\xi\sigma_{el}}{\sigma_{\gamma}} = 0.92*25/0.33 = 70$

6. To maintain the moderator temperature within a permissible range

7. Moderator pump, Heat exchangers and Valves