The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific and
Cultural Organization

IAEA
International Atomic Energy Agency

2055-16

Joint ICTP/IAEA School on Physics and Technology of Fast Reactors Systems

9 - 20 November 2009

ENJOY QUIZZING - 2

Radiation Damage of Structural Materials for Fast Reactor Fuel Assembly

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ENJOY QUIZZING : CHAPTER 2

1.) Answer Right or Wrong.

a. Interstitials move faster than vacancies.
b. Easier to form vacancies than interstitials.
c. Voids shrink when interstitials arrive at the void surface.
d. Ni3Al produces more vancancies than Ni when irradiated under identical conditions.
e. Void swelling in Al is more than W, when both are irradiated at 300C with other conditions remaining identical.
f. Cold work reduces void swelling due to 2% bias to interstitials.
g. Ni and P are beneficial in suppressing void swelling.
h. Irradiation creep is caused by SIPA and SIPN.

2. Consider a perfect single crystal lattice with no dislocations. For a given dose rate and dose of n's of energy 2 MeV at 550C, calculate the amount of swelling.(amount of swelling = growth rate of single void x no. density of voids.)

3**. Reason out the following observations, in five to six lines:**

a. Minimum creep rate is high with increase in applied stress.
b. Coherent precipitates in a matrix reduces void swelling.
c. Irradiation hardening is less in brittle material than ductile material.
d. Non-cubic materials o nly show irradiation growth.
e. High temperatures are favourable for designing swelling resistant materials.

4. Irradiated microstructure dictates the extent of hardening in a material. Your goal is to limit the radiation hardening in the material. Assume in your material, all the hardening comes from "voids" for a fixed no. of vacancies in voids, what will be your choice to reduce hardening : (a) large number density of small voids or (b) small number density of large voids. Explain your reasoning.