with theoretical works of calculated fission barriers that also reveal a fine structure in ^{232}Th.

REFERENCES:

1. Amiel, S. and Feldstein, H., Phys. Rev. C, 11, 845 (1975)
2. Denschlag, H. and Qaim, S., J. Inorg. Nucl. Chem. 33, 3649 (1971)

RATIOS OF INDEPENDENT YIELDS OF KRYPTON AND XENON ISOTOPES TO THE CUMULATIVE YIELDS OF THEIR PRECURSORS IN THE THERMAL NEUTRON FISSION OF ^{235}U

H. Feldstein and S. Amiel

Krypton and xenon isotopes formed in the thermal neutron fission of U-235 were released from an uranium oxide - barium stearate target and mass separated by SOLIS (Soreq on-line isotope separator). The contamination of the separated isotopes by their precursors (iodine and bromine) was about 2%, and cross contamination by adjacent mass was less than 5%. The separated isotopes were beta counted during their accumulation in the collector and the yield ratio of the separated isotope to the cumulative yield of its precursor was calculated from the beta activity curve measured as a function of irradiation time (growth curve). The analysis of the growth curve was performed with the aid of the least squares computer program ON LINE assuming known half-lives of the separated isotope and its precursor, with correction for transfer time using an experimental transfer time function. Alternatively, an analysis of the exponential components of the growth curve was performed for the cases in which the transfer time could be neglected (CLSQ program). In the above calculations, a steady ion current is assumed, but otherwise the method does not impose any restrictions and is independent of counter efficiencies since only one isotope is counted. The basic equation for the calculation is (disregarding the transfer time function):

$$A = K[1-\exp(-\lambda t)] + K_p[1 - \frac{\lambda}{\lambda-\lambda_p} \exp(-\lambda_p t) + \frac{\lambda_p}{\lambda-\lambda_p} \exp(-\lambda t)]$$

where A is the measured activity, K is the constant rate of formation of the separated isotope, K_p is the rate of formation of the precursor, λ is the decay constant of the separated isotope, λ_p is the decay constant of the precursor. The results of the calculations are summarized in Table 3 and are in good agreement with other experimental results.

TABLE 3

Krypton and xenon yields in thermal neutron fission of ^{235}U

Isotope	Chain yield (1) %	Yield ratio*	Independent yield of noble gas, %	Cumulative yield of halogen, %	Other experimental values Noble gas	Halogen
Kr-87	2.55 ± 0.07	$3.87^{+0.1}_{-0.5}$	$0.507^{+0.06}_{-0.01}$	$1.96^{+0.01}_{-0.06}$	0.36 ± 0.03 (2) 0.51 ± 0.06 (3)	2.0 ± 0.22 (3)
Kr-88	3.62 ± 0.07	2.07 ± 0.5	$1.16^{+0.22}_{-0.16}$	$2.405^{+0.16}_{-0.23}$	1.32 ± 0.1 (2) 1.66 ± 0.11 (3)	1.86 ± 0.44 (3)
Kr-89	4.80 ± 0.10	-	3.40 ± 0.5	1.17 ± 0.5	3.26 ± 0.19 (2) 3.41 ± 0.15 (3)	2.32 ± 0.4 (1) 1.07 ± 0.11 (3)
Xe-137	6.26 ± 0.16	$2.7^{+0.2}_{-0.5}$	$1.726^{+0.245}_{-0.10}$	$4.66^{+0.10}_{-0.245}$	$2.97^{+0.4}_{-0.32}$ (2)	1.81 ± 0.4 (4)
Xe-138	6.80 ± 0.17	0.196 ± 0.05	$5.39^{+0.28}_{-0.16}$	$1.06^{+0.16}_{-0.28}$	$5.03^{+0.62}_{-0.50}$ (2)	0.84 ± 0.17 (4)
Xe-139	6.5 ± 0.12	0.094 ± 0.02	$4.67^{+0.08}_{-0.08}$	$0.44^{+0.08}_{-0.08}$	$5.16^{+0.5}_{-0.4}$ (2)	0.47 ± 0.25 (4)

*Ratio of the cumulative yield of the precursor to independent yield of the separated isotope

REFERENCES:

1. Walker, W.H., AECL-4704, 1974.
2. Ehrenberg, B. and Amiel, S., Phys. Rev. C6, 618 (1972)
3. Clerc, H.B. et al., Phys. A274, 203 (1975)
4. Venezia, A., Ph.D. Thesis, Hebrew University, Jerusalem (1973), IA-1284 (in Hebrew)

SYSTEMATICS OF DELAYED NEUTRON EMISSION PROBABILITIES IN MEDIUM MASS NUCLIDES (FISSION PRODUCTS)

Y. Nir-El and S. Amiel

According to the delayed neutron emission probability formula the various types of delayed neutron precursors exhibit a systematic behavior governed by the level density, the excitation energy and the pairing of the precursor nucleus.

The updated population of precursors has recently been increased and now includes 45 precursors with relatively well-determined emission probability values. This permits revealing of group features with good precision. The systematic behavior was found to be determined by the nuclear pairing and the mass region of the precursor. The derivation of the systematics is based on a simplification of the general formula of the emission probability. The comparison made with the available experimental data leads to a semi-empirical formula for delayed neutron probabilities. This formula was used for the prediction of unknown values of emission probabilities for unidentified precursors.

EXCITATION ENERGIES AND PROMPT NEUTRON YIELDS IN LOW-ENERGY FISSION

Y. Nir-El and S. Amiel

Excitation energies and prompt neutron yields of primary fragments were calculated for the fission of ^{236}U induced by thermal neutrons. Excitation energies were calculated using the relation between excitation energy and nuclear temperature, assuming a thermal equilibrium at the moment of scission. A semi-empirical calculation of prompt neutron yields was based on prompt neutron and gamma ray emission data. The Jackson evaporation model was used to calculate theoretical neutron yields and the results were compared with experimental data. Further improvements of these calculations are in progress.