NJOY's heatr, gaspr, groupr usage, capability, and limitation

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NJOY's heatr simulation of the energy-balance Kerma (kinetic energy release in material) provides a sensitive test of the consistency between the energy available from E+Q and the energy emitted as secondary neutrons and photons. The energy released by charged-particles and the recoil nucleus from an induced nuclear reaction is given by E + Q - E-bar-neutron - E-bar-gamma. Unfortunately, many nuclear evaluations are less than perfect in form and format and strange effects may occur, negative values or cooling instead of heating. In addition to computing the energy-balance heating, heatr also computes some kinematic limits that should bracket the energy-balance heating. The module prepares graphs showing the computed heating and its kinematic limits, for both neutron and photon. NJOY's gaspr extend all gas (a<4) production reactions while NJOY's groupr outputs light particle and residual production matrices. Recent applications have highlighted the needs for more detailed description of partials proton and alpha output channels while format consideration need to be carefully recognised when assembling evaluation with those same particles in the entrance channel. Added complexity occur when the material is composed of light nucleus, embedded in a compound environment or complex by nature.

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