```
(*Nuclear Species Experimental Data*)
isotopeName = "U-238";
databaseName = "JENDL-5";

atomicNumber = 92;(*Atomic number*)
neutronNumber = 147;(*Compound nucleus neutron number*)

energyPattern = 5;(*Input required*)(*energyPattern=1;
Data at 0.0253eV*)(*energyPattern=2;
Data at 0.0253eV,500keV*)(*energyPattern=3;
Data at 0.0253eV,500keV,14MeV*)(*energyPattern=4;
Data at 500keV*)(*energyPattern=5;
Data at 500keV,14MeV*)

(*Incident Neutron Kinetic Energy*)
neutronEnergy2 = 0.5;(*500 keV*)
neutronEnergy3 = 14;(*14 MeV*)

(*Average Number of Prompt Neutrons*)
promptNeutrons2 = 2.579;(*500 keV*)
promptNeutrons3 = 4.458;(*14 MeV*)

(*Neutron Separation Energy*)
neutronSeparationEnergy = 4806.3 / 1000;

(*Charge Distribution Experimental Data JENDL-5*)
yieldData500keV =
  {{23, 8.0546000 * 10^(-15)}, {24, 3.5895072 * 10^(-11)}, {25, 6.5466712 * 10^(-09)},
   {26, 1.6234693 * 10^(-07)}, {27, 6.1041301 * 10^(-07)}, {28, 1.8563953 * 10^(-06)},
   {29, 8.1211560 * 10^(-06)}, {30, 1.0477176 * 10^(-04)}, {31, 7.2120567 * 10^(-04)},
   {32, 4.8171057 * 10^(-03)}, {33, 1.4089208 * 10^(-02)}, {34, 2.9902939 * 10^(-02)},
   {35, 6.0636309 * 10^(-02)}, {36, 9.6479731 * 10^(-02)}, {37, 1.1276355 * 10^(-01)},
   {38, 1.6995136 * 10^(-01)}, {39, 1.2372369 * 10^(-01)}, {40, 2.1292178 * 10^(-01)},
   {41, 9.0389061 * 10^(-02)}, {42, 7.2698593 * 10^(-02)}, {43, 8.1398077 * 10^(-03)},
   {44, 1.0361767 * 10^(-03)}, {45, 8.7548716 * 10^(-04)}, {46, 1.0124857 * 10^(-03)},
   {47, 8.7966243 * 10^(-04)}, {48, 1.1152671 * 10^(-03)}, {49, 5.2276509 * 10^(-03)},
   {50, 5.1884872 * 10^(-02)}, {51, 1.1676863 * 10^(-01)}, {52, 1.7070741 * 10^(-01)},
   {53, 1.6989076 * 10^(-01)}, {54, 1.3199846 * 10^(-01)}, {55, 1.1105448 * 10^(-01)},
   {56, 1.0768902 * 10^(-01)}, {57, 7.4008031 * 10^(-02)}, {58, 4.0220424 * 10^(-02)},
   {59, 1.2714910 * 10^(-02)}, {60, 4.4839050 * 10^(-03)}, {61, 9.0186017 * 10^(-04)},
   {62, 1.6443979 * 10^(-04)}, {63, 1.3033120 * 10^(-05)}, {64, 2.2149734 * 10^(-06)},
   {65, 6.6984321 * 10^(-07)}, {66, 2.4746632 * 10^(-07)}, {67, 4.5711475 * 10^(-08)},
   {68, 1.7568430 * 10^(-09)}, {69, 3.1071222 * 10^(-12)}, {70, 0}, {71, 0}};

yieldData14MeV = {{23, 2.3900700 * 10^(-14)}, {24, 1.3726537 * 10^(-10)},
   {25, 2.9247087 * 10^(-08)}, {26, 8.3428518 * 10^(-07)},
   {27, 6.1024254 * 10^(-06)}, {28, 3.2919733 * 10^(-05)}, {29, 1.4086956 * 10^(-04)},
   {30, 5.4246134 * 10^(-04)}, {31, 2.2750910 * 10^(-03)}, {32, 7.2560669 * 10^(-03)},
   {33, 1.8126271 * 10^(-02)}, {34, 3.3486472 * 10^(-02)}, {35, 5.5988236 * 10^(-02)},
   {36, 8.6642946 * 10^(-02)}, {37, 1.1270510 * 10^(-01)}, {38, 1.3069283 * 10^(-01)},
   {39, 1.3932716 * 10^(-01)}, {40, 1.3723355 * 10^(-01)}, {41, 1.1251643 * 10^(-01)},
   {42, 7.0118888 * 10^(-02)}, {43, 3.6316807 * 10^(-02)}, {44, 2.5864813 * 10^(-02)},
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    {45, 2.1150828 * 10^(-02)}, {46, 1.9957877 * 10^(-02)}, {47, 2.2343348 * 10^(-02)},
    {48, 2.5436310 * 10^(-02)}, {49, 3.8772648 * 10^(-02)}, {50, 6.9563087 * 10^(-02)},
    {51, 1.0911729 * 10^(-01)}, {52, 1.3850361 * 10^(-01)}, {53, 1.4163540 * 10^(-01)},
    {54, 1.1732256 * 10^(-01)}, {55, 1.1858486 * 10^(-01)}, {56, 8.8844686 * 10^(-02)},
    {57, 5.6765733 * 10^(-02)}, {58, 3.3992696 * 10^(-02)}, {59, 1.7877820 * 10^(-02)},
    {60, 7.2955056 * 10^(-03)}, {61, 2.5551956 * 10^(-03)}, {62, 7.5260618 * 10^(-04)},
    {63, 1.9269712 * 10^(-04)}, {64, 4.7890286 * 10^(-05)}, {65, 1.0940465 * 10^(-05)},
    {66, 2.2479184 * 10^(-06)}, {67, 3.4155819 * 10^(-07)}, {68, 1.8509764 * 10^(-08)},
    {69, 1.4753700 * 10^(-10)}, {70, 1.1231173 * 10^(-13)}, {71, 0}};

optResult500keVRe1 =
  {1.201922352537904*^-11, {effectiveDistance500keV[23, 69] -> 0.18694052292804178`,
    effectiveDistance500keV[24, 68] -> 0.5606062230564043,
    effectiveDistance500keV[25, 67] -> 0.7671363080983462,
    effectiveDistance500keV[26, 66] -> 0.8334619469178293,
    effectiveDistance500keV[27, 65] -> 0.904253572461493,
    effectiveDistance500keV[28, 64] -> 0.9702215949067146,
    effectiveDistance500keV[29, 63] -> 0.9965058910756787,
    effectiveDistance500keV[30, 62] -> 1.0200523565911526`,
    effectiveDistance500keV[31, 61] -> 1.043634543375186,
    effectiveDistance500keV[32, 60] -> 1.0642966831554699`,
    effectiveDistance500keV[33, 59] -> 1.0855047658695764`,
    effectiveDistance500keV[34, 58] -> 1.1034124798954767`,
    effectiveDistance500keV[35, 57] -> 1.1216267056789588`,
    effectiveDistance500keV[36, 56] -> 1.1360273189963666`,
    effectiveDistance500keV[37, 55] -> 1.1509633333090987`,
    effectiveDistance500keV[38, 54] -> 1.1615866950307203`,
    effectiveDistance500keV[39, 53] -> 1.172634627712508,
    effectiveDistance500keV[40, 52] -> 1.1805378350101514`,
    effectiveDistance500keV[41, 51] -> 1.1888294819690914`,
    effectiveDistance500keV[42, 50] -> 1.1944785113944196`,
    effectiveDistance500keV[43, 49] -> 1.2013668721254562`,
    effectiveDistance500keV[44, 48] -> 1.204261557462385,
    effectiveDistance500keV[45, 47] -> 1.2082470199314843`,
    effectiveDistance500keV[46, 46] -> 1.2081842066943258`,
    effectiveDistance500keV[47, 45] -> 1.2082489463697528`,
    effectiveDistance500keV[48, 44] -> 1.204291208386729,
    effectiveDistance500keV[49, 43] -> 1.2011886303878503`,
    effectiveDistance500keV[50, 42] -> 1.194343616443659,
    effectiveDistance500keV[51, 41] -> 1.18893160267174,
    effectiveDistance500keV[52, 40] -> 1.1804502597646163`,
    effectiveDistance500keV[53, 39] -> 1.1727598182857182`,
    effectiveDistance500keV[54, 38] -> 1.1614877370110457`,
    effectiveDistance500keV[55, 37] -> 1.1509573878567605`,
    effectiveDistance500keV[56, 36] -> 1.136069597654967,
    effectiveDistance500keV[57, 35] -> 1.1217026127685692`,
    effectiveDistance500keV[58, 34] -> 1.1035236713347099`,
    effectiveDistance500keV[59, 33] -> 1.0854667909345852`,
    effectiveDistance500keV[60, 32] -> 1.0642706478977573`,
    effectiveDistance500keV[61, 31] -> 1.0437144248181691`,
    effectiveDistance500keV[62, 30] -> 1.0202101160912926`,
    effectiveDistance500keV[63, 29] -> 0.9966681881218344,
    effectiveDistance500keV[64, 28] -> 0.9702807195645754,
    effectiveDistance500keV[65, 27] -> 0.9042535724612437,
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    effectiveDistance500keV[66, 26] -> 0.8334619469177975,
    effectiveDistance500keV[67, 25] -> 0.7671363080975449,
    effectiveDistance500keV[68, 24] -> 0.5606062230547574,
    effectiveDistance500keV[69, 23] -> 0.1869405229296253}};

optResult14MeVRe1 =
  {2.0582143704533768`*^-9, {effectiveDistance14MeV[23, 69] -> 0.17389639797353842`,
    effectiveDistance14MeV[24, 68] -> 0.4409838900246966,
    effectiveDistance14MeV[25, 67] -> 0.7337415851263733,
    effectiveDistance14MeV[26, 66] -> 0.8737939637751738,
    effectiveDistance14MeV[27, 65] -> 0.9199925833880054,
    effectiveDistance14MeV[28, 64] -> 0.9543486703607121,
    effectiveDistance14MeV[29, 63] -> 0.9844051363395544,
    effectiveDistance14MeV[30, 62] -> 1.0114471831850316`,
    effectiveDistance14MeV[31, 61] -> 1.0387396617978477`,
    effectiveDistance14MeV[32, 60] -> 1.0628262973160545`,
    effectiveDistance14MeV[33, 59] -> 1.0870889597536622`,
    effectiveDistance14MeV[34, 58] -> 1.107595223787218,
    effectiveDistance14MeV[35, 57] -> 1.128177705060168,
    effectiveDistance14MeV[36, 56] -> 1.1450063188030337`,
    effectiveDistance14MeV[37, 55] -> 1.161998333198667,
    effectiveDistance14MeV[38, 54] -> 1.174640921639173,
    effectiveDistance14MeV[39, 53] -> 1.187712916881473,
    effectiveDistance14MeV[40, 52] -> 1.1970967376089552`,
    effectiveDistance14MeV[41, 51] -> 1.2067465405112288`,
    effectiveDistance14MeV[42, 50] -> 1.2126250887095749`,
    effectiveDistance14MeV[43, 49] -> 1.219919001619286,
    effectiveDistance14MeV[44, 48] -> 1.2235829425851812`,
    effectiveDistance14MeV[45, 47] -> 1.2275889610998438`,
    effectiveDistance14MeV[46, 46] -> 1.2275719887298875`,
    effectiveDistance14MeV[47, 45] -> 1.2276702183924155`,
    effectiveDistance14MeV[48, 44] -> 1.2235583046524663`,
    effectiveDistance14MeV[49, 43] -> 1.2200152794190733`,
    effectiveDistance14MeV[50, 42] -> 1.2126134620984323`,
    effectiveDistance14MeV[51, 41] -> 1.2067018715367015`,
    effectiveDistance14MeV[52, 40] -> 1.1971100438453828`,
    effectiveDistance14MeV[53, 39] -> 1.1877365009197207`,
    effectiveDistance14MeV[54, 38] -> 1.1744877689348605`,
    effectiveDistance14MeV[55, 37] -> 1.16206985549415,
    effectiveDistance14MeV[56, 36] -> 1.145041071471671,
    effectiveDistance14MeV[57, 35] -> 1.1281965403802894`,
    effectiveDistance14MeV[58, 34] -> 1.1076153212455226`,
    effectiveDistance14MeV[59, 33] -> 1.0870708079659477`,
    effectiveDistance14MeV[60, 32] -> 1.0628332561817957`,
    effectiveDistance14MeV[61, 31] -> 1.0388853488097027`,
    effectiveDistance14MeV[62, 30] -> 1.0118465937237031`,
    effectiveDistance14MeV[63, 29] -> 0.9847769820351051,
    effectiveDistance14MeV[64, 28] -> 0.9547791654960575,
    effectiveDistance14MeV[65, 27] -> 0.9199925833877655,
    effectiveDistance14MeV[66, 26] -> 0.8737939637747277,
    effectiveDistance14MeV[67, 25] -> 0.7337415851254304,
    effectiveDistance14MeV[68, 24] -> 0.4409838900225891,
    effectiveDistance14MeV[69, 23] -> 0.1738963979707808}};

optResult500keVRe2 =
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{8.29444191701714*^-12, {fermiEnergy500keV[23, 69] -> 1.0000000000000135`,
  fermiEnergy500keV[24, 68] -> 1.0000000000229086`,
  fermiEnergy500keV[25, 67] -> 1.000000000136337, fermiEnergy500keV[26, 66] ->
   1.0000000616796207`, fermiEnergy500keV[27, 65] -> 1.000000098143331,
  fermiEnergy500keV[28, 64] -> -1.561689780469426, fermiEnergy500keV[29, 63] ->
   0.33759974480290683`, fermiEnergy500keV[30, 62] -> -1.1606454344388297`,
  fermiEnergy500keV[31, 61] -> 1.170706072410337, fermiEnergy500keV[32, 60] ->
   -0.1730821432089588, fermiEnergy500keV[33, 59] -> 3.330690962757763,
  fermiEnergy500keV[34, 58] -> 2.4011239477754485`, fermiEnergy500keV[35, 57] ->
   5.555399143962238, fermiEnergy500keV[36, 56] -> 3.3220622323979696`,
  fermiEnergy500keV[37, 55] -> 5.586047572081435, fermiEnergy500keV[38, 54] ->
   1.5642341961894681`, fermiEnergy500keV[39, 53] -> 1.721060940158278,
  fermiEnergy500keV[40, 52] -> -1.7340976999383444`,
  fermiEnergy500keV[41, 51] -> -1.190268457020064,
  fermiEnergy500keV[42, 50] -> -3.1562888913227236`,
  fermiEnergy500keV[43, 49] -> 0.5849818923196959,
  fermiEnergy500keV[44, 48] -> -1.014939143032233,
  fermiEnergy500keV[45, 47] -> 2.728117176600381,
  fermiEnergy500keV[46, 46] -> 1.0660219694856246`,
  fermiEnergy500keV[47, 45] -> 2.72393149300697,
  fermiEnergy500keV[48, 44] -> -0.9692061030742549,
  fermiEnergy500keV[49, 43] -> 0.1854648087270372,
  fermiEnergy500keV[50, 42] -> -3.4754116955741376`,
  fermiEnergy500keV[51, 41] -> -1.0144841951013652`,
  fermiEnergy500keV[52, 40] -> -1.9728565721728344`,
  fermiEnergy500keV[53, 39] -> 1.9324787867149111`,
  fermiEnergy500keV[54, 38] -> 1.2786666841525023`,
  fermiEnergy500keV[55, 37] -> 5.49442713520468,
  fermiEnergy500keV[56, 36] -> 3.3286615304045006`,
  fermiEnergy500keV[57, 35] -> 5.629726947695922,
  fermiEnergy500keV[58, 34] -> 2.550402184132557,
  fermiEnergy500keV[59, 33] -> 3.118638566483797,
  fermiEnergy500keV[60, 32] -> -0.37070422972367145`,
  fermiEnergy500keV[61, 31] -> 1.2231143409681289`,
  fermiEnergy500keV[62, 30] -> -0.916084941981759,
  fermiEnergy500keV[63, 29] -> 0.5907371338448962,
  fermiEnergy500keV[64, 28] -> -1.5930131062498984`,
  fermiEnergy500keV[65, 27] -> 1.0000001232916043`,
  fermiEnergy500keV[66, 26] -> 1.0000000789497476`,
  fermiEnergy500keV[67, 25] -> 1.0000000001780933`,
  fermiEnergy500keV[68, 24] -> 1.0000000000305973`,
  fermiEnergy500keV[69, 23] -> 1.0000000000000187`}};

optResult14MeVRe2 =
  {5.682190628411665*^-10, {fermiEnergy14MeV[23, 69] -> 1.0000000000041749`,
    fermiEnergy14MeV[24, 68] -> 1.0000000009180916`,
    fermiEnergy14MeV[25, 67] -> 1.0000000222144938`,
    fermiEnergy14MeV[26, 66] -> 1.0000009659487363`, fermiEnergy14MeV[27, 65] ->
     1.000006241761336, fermiEnergy14MeV[28, 64] -> -1.8867302685113183`,
    fermiEnergy14MeV[29, 63] -> -0.15558482377056707`, fermiEnergy14MeV[30, 62] ->
     -2.0414881670390237`, fermiEnergy14MeV[31, 61] -> 1.0839972871361871`,
    fermiEnergy14MeV[32, 60] -> 0.2828215577664465, fermiEnergy14MeV[33, 59] ->
     3.9445494083464046`, fermiEnergy14MeV[34, 58] -> 2.619828179322327,
    fermiEnergy14MeV[35, 57] -> 5.337362534919436, fermiEnergy14MeV[36, 56] ->
     3.36443512199686, fermiEnergy14MeV[37, 55] -> 5.482816094014468,
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fermiEnergy14MeV[38, 54] -> 1.8372085952806638`,
fermiEnergy14MeV[39, 53] -> 2.7576313037238687`,
fermiEnergy14MeV[40, 52] -> -0.5265902538198415,
fermiEnergy14MeV[41, 51] -> 0.28726289661752497`,
fermiEnergy14MeV[42, 50] -> -3.2019499698099336`,
fermiEnergy14MeV[43, 49] -> -0.32430834089262756`,
fermiEnergy14MeV[44, 48] -> -1.4347881173662,
fermiEnergy14MeV[45, 47] -> 1.5574952033169125`,
fermiEnergy14MeV[46, 46] -> -0.18899973179829146`,
fermiEnergy14MeV[47, 45] -> 1.6996380624560552`,
fermiEnergy14MeV[48, 44] -> -1.5290917887758413`,
fermiEnergy14MeV[49, 43] -> -0.1947184246056488,
fermiEnergy14MeV[50, 42] -> -3.31533454555896,
fermiEnergy14MeV[51, 41] -> 0.08213318201698047,
fermiEnergy14MeV[52, 40] -> -0.6354745153171663,
fermiEnergy14MeV[53, 39] -> 2.6459761004128404`,
fermiEnergy14MeV[54, 38] -> 1.322087495933608,
fermiEnergy14MeV[55, 37] -> 5.424110381820785,
fermiEnergy14MeV[56, 36] -> 3.199288968210815,
fermiEnergy14MeV[57, 35] -> 5.108008058714754,
fermiEnergy14MeV[58, 34] -> 2.362843819915727,
fermiEnergy14MeV[59, 33] -> 3.5641558725127984`,
fermiEnergy14MeV[60, 32] -> -0.07386063515516313,
fermiEnergy14MeV[61, 31] -> 1.0385105684020608`,
fermiEnergy14MeV[62, 30] -> -1.4522401297021075`,
fermiEnergy14MeV[63, 29] -> 0.35039052824317574`,
fermiEnergy14MeV[64, 28] -> -1.2228471187899277`,
fermiEnergy14MeV[65, 27] -> 1.000007522369137,
fermiEnergy14MeV[66, 26] -> 1.0000011847451178`,
fermiEnergy14MeV[67, 25] -> 1.0000000277842878`,
fermiEnergy14MeV[68, 24] -> 1.0000000011738235`,
fermiEnergy14MeV[69, 23] -> 1.0000000000054732`}};
```