## Compilation of experimental nuclear reaction data measured in Central Asia region

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The Kazakhstan team has been continuing to compile Kazakhstan nuclear reaction experiments to the EXFOR database. Since the previous Technical Meeting on NRDC 2019 (9-12 April 2019, Vienna, Austria), our compilation group has compiled 8 entries. The new EXFOR entries are shown in Table below. All experiments are related to charged particles and were performed on the accelerators of the Institute of Nuclear Physics. Numerical data for all these entries are received from the authors.

| Entry | First author | Article | Accelerator |
|---|---|---|---|
| D8030 | T.Zholdybayev | J,EPJ/CS,239,01033,2020 | U-150M |
| D8007 | Gazeeva+ | J,BAS,84,420,2020 | DC-60 |
| D8006 | Nauruzbayev+ | J,PAN,83,520,2020 | DC-60 |
| D8020 | Y.Mukhamejanov+ | J,APP/B,51,783,2020 | U-150M |
| D8009 | A.K.Nurmukhanbetova+ | J,PR/C,100,062802,2019 | DC-60 |
| D8005 | T.Zholdybayev | J,BAS,83,(9),1293,2019 | U-150M |
| D8003 | N.Burtebayev | J,IMP/E,27,1850025,2018 | U-150M |
| D8002 | A.Amar | J,IMP/E,20,980,2011 | UKP-2-1, DC-60 |

The Institute of Nuclear Physics of Academy of Science Kaz. SSR (Almaty) published three preprints tabulating cross sections for light charged particles accelerated by the cyclotron of the institute in 1970, 1990 and 1991. Within Action A35 “Compilation of differential cross sections in preprints” we made all numbers computer readable and compiled in EXFOR entries. When there is an EXFOR entry compiling the same data set (typically by digitization) with an appropriate citation, we revised the EXFOR entry. Otherwise the data set was compiled in a new EXFOR entry. When we could not find any publication suitable for citation, the data set were compiled in D8016, D8017 or D8013 for the preprints published in 1970, 1990 and 1991, respectively.

1. Numerical data on elastic and inelastic scattering on light and medium nuclei printed in Gonchar’s preprint were made computer readable and compiled in EXFOR D8014, D8015, D8016 and F1168.;
2. Numerical data on elastic and inelastic scattering of a-particles and $^{3}$He ions with energy from 30 to 60 MeV on nuclei with Z=28-50 printed in Kuterbekov’s preprint were made computer readable and compiled in EXFOR D8013, F0560 and F0561;
3. A part of the numerical data on elastic and inelastic scattering on nuclides with Z=6-50 (Pavlova’s preprint) made computer readable in the last action A33 but still missing in EXFOR were compiled in EXFOR D8017, F0497, F0668, F0865 and F1160

We continue to find the numerical data in laboratory logbooks which we can include in the new or old EXFOR entries. For entries below we prepared numerical data and the relevant EXFOR entries are ready.

1. Numerical data on double-differentials cross-section from interaction of $^{3}$He ions on $^{27}$Al, $^{58}$Ni, $^{60}$Ni, $^{59}$Co and $^{90}$Zr kept in a laboratory logbook were made computer readable and compiled in EXFOR D8012;
2. Numerical data on double-differentials cross-section from interaction of $^{3}$He ions on $^{61}$Ni and $^{57}$Fe kept in a laboratory logbook were made computer readable and compiled in EXFOR D8011;

**Appendix: Summary of prepared numerical data**

| Targ. | Proj. | Quant. | Reaction | $E_{lab}$ (MeV) | Reference | EXFOR | Our comments and questions |
|---|---|---|---|---|---|---|---|
| **R,IYFK-P-104,1970** | | | | | | | |
| $^{1}$H | a | DA | elastic | 39 | R,IYFK-P-104,1970 | D8016.002 | |
| $^{12}$C | a | DA | elastic | 39 | R,IYFK-P-104,1970 | D8016.003 | Superseded by D8017.002 (Table 17) |
| $^{24}$Mg | a | DA, DAP | elastic, inelastic | 39 | J,IZV,32,604,1968 | D8016.004 | Superseded by F0668.002 (Table 18) |
| $^{28}$Si | a | DA, DAP | elastic, inelastic | 39 | J,IZV,32,604,1968 | D8016.005 | Superseded by F0668.003 (Table 19) |
| $^{58}$Ni | a | DA, DAP | elastic, inelastic | 38 | J,IZK,,(6),16,1968; J,YF,8,678,1968 | D8015.002+003 | Delete F1168.002 and F1184.003+004. |
| $^{64}$Ni | a | DA, DAP | elastic, inelastic | 38 | J,IZK,,(6),16,1968; J,YF,8,678,1968 | D8015.004+005 | |
| $^{64}$Zn | a | DA, DAP | elastic, inelastic | 39 | J,IZK,,(6),16,1968; J,YF,8,678,1968 | D8015.006+007 | |
| $^{68}$Zn | a | DA, DAP | elastic, inelastic | 39 | J,IZK,,(6),16,1968; J,YF,8,678,1968 | D8015.008+009 | |
| $^{74}$Ge | a | DA, DAP | elastic, inelastic | 39 | J,YF,5,1179,1967 | D8016.006 | Superseded by D8017.004 (Table 24) |
| $^{nat}$Pb | a | DA, DAP | elastic, inelastic | 39 | J,YF,5,1179,1967 | F1168.003 | |
| $^{1}$H | d | DA | elastic | 19 | J,IZK,,(4),34,1969 | D8014.002 | |
| $^{1}$H | d | DAP | d,p | 19 | J,IZK,,(4),34,1969 | D8014.003 | |
| $^{12}$C | d | DAP | d,p | 19 | J,IZK,,(4),34,1969 | D8014.004 | |
| $^{28}$Si | d | DAP | d,p | 19 | J,IZK,,(4),34,1969 | D8014.005 | |
| $^{52}$Cr | d | DAP | d,p | 19 | J,IZK,,(4),34,1969 | D8014.006 | |
| **W,KUTERBEKOV,1991** | | | | | | | |
| $^{90}$Zr | a | DA, DAP | elastic, inelastic | 50,1 | J,YF,66,627,2003 | F0561.008+009 (PRELIM.F075) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $^{94}$Zr | a | DA, DAP | elastic, inelastic | 50,1 | J,YF,66,627,2003 | F0561.010+011 (PRELIM.F075) | +inl 3,04 MeV |
| $^{92}$Mo | a | DA, DAP | elastic, inelastic | 49,2 | W,KUTERBEKOV,1991 | D8013.002+003 | |
| $^{94}$Mo | a | DA, DAP | elastic, inelastic | 50,5 | W,KUTERBEKOV,1991 | D8013.004+005 | |
| $^{96}$Mo | a | DA | elastic | 45 | W,KUTERBEKOV,1991 | D8013.006 | |
| $^{98}$Mo | a | DA, DAP | elastic, inelastic | 45 | W,KUTERBEKOV,1991 | D8013.007+008 | |
| $^{112}$Sn | a | DA, DAP | elastic, inelastic | 50,1 | W,KUTERBEKOV,1991 | D8013.009+010 | |
| $^{114}$Sn | a | DA, DAP | elastic, inelastic | 50,1 | W,KUTERBEKOV,1991 | D8013.011+012 | |
| $^{116}$Sn | a | DA, DAP | elastic, inelastic | 40,4 | W,KUTERBEKOV,1991 | D8013.013+014 | |
| $^{118}$Sn | a | DA, DAP | elastic, inelastic | 50.5 | W,KUTERBEKOV,1991 | D8013.015+016 | |
| $^{120}$Sn | a | DA, DAP | elastic, inelastic | 50,5 | C,2001SAROV,194,2001 | F0560.002+003 (PRELIM.F075) | +inl 3,18; 3,8; 4,8 MeV |
| $^{122}$Sn | a | DA, DAP | elastic, inelastic | 40,1 | W,KUTERBEKOV,1991 | D8013.017+018 | |
| $^{124}$Sn | a | DA, DAP | elastic, inelastic | 40,4 | W,KUTERBEKOV,1991 | D8013.019+020 | |
| $^{124}$Sn | a | DA, DAP | elastic, inelastic | 50,5 | C,2001SAROV,194,2001 | F0560.004+005 (PRELIM.F075) | |
| $^{64}$Ni | $^{3}$He | DA, DAP | elastic, inelastic | 50 | W,KUTERBEKOV,1991 | D8013.021+022 | |
| $^{64}$Zn | $^{3}$He | DA, DAP | elastic, inelastic | 50 | W,KUTERBEKOV,1991 | D8013.023+024 | |
| **LABORATORY LOGBOOKS** | | | | | | | |
| $^{27}$Al | 3He | DA/DE | double- | 60 | J,SNP,48,409,1988 | D8012.002+003 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | differential | | | | |
| $^{58}$Ni | 3He | DA/DE | double-differential | 60 | J,SNP,48,409,1988 | D8012.004+005 | |
| $^{60}$Ni | 3He | DA/DE | double-differential | 60 | J,SNP,48,409,1988 | D8012.006+007 | |
| $^{59}$Co | 3He | DA/DE | double-differential | 60 | J,SNP,48,409,1988 | D8012.008+009 | |
| $^{90}$Zr | 3He | DA/DE | double-differential | 60 | J,SNP,48,409,1988 | D8012.010+011 | |
| $^{61}$Ni | 3He | DA/DE | double-differential | 23 | J,BAS,45,(11),134,1981 | D8011.006+007+008+009 | |
| $^{61}$Ni | 3He | DA/DE | double-differential | 34 | J,BAS,45,(11),134,1981 | D8011.006+007+008+009 | |
| $^{57}$Fe | 3He | DA/DE | double-differential | 23 | J,BAS,45,(11),134,1981 | D8011.002+003+004+005 | |
| $^{57}$Fe | 3He | DA/DE | double-differential | 34 | J,BAS,45,(11),134,1981 | D8011.002+003+004+005 | |