Pb(^{35}Al,^{34}Alnγ) 2017Ch36

Coulomb dissociation of ^{35}Al on Pb target.

2017Ch36,2014ChZZ: ^{35}Al was produced via the projectile fragmentation of a 531-MeV/nucleon ^{40}Ar primary beam from the Heavy Ion Synchrotron (SIS18) at GSI. The secondary cocktail beam was separated by the FRS separator and impinged on a 2 g/cm^2 Pb target and a 0.93 g/cm^2 C target. Projectiles and reaction fragments were detected using 8 DSSDs, separated by a large-area dipole magnet (ALADIN) and tracked using two large scintillator fiber detectors (GFIs). Neutrons from the excited projectiles were detected using the high-efficiency Large Area Neutron Detector (LAND). γ rays from the deexcited projectile and projectile-like fragments were detected using a spherical 4π Crystal Ball detector array of 162 NaI(Tl) crystals. Measured E(fragment), E(n), Eγ, Coulomb dissociation cross sections. Deduced relative populations of ^{34}Al, ^{35}Al g.s. configuration. Comparisons with shell-model calculations with the SDPF-M interaction. The measured inclusive differential CD cross section integrated up to 5.0 MeV relative energy for ^{35}Al -> ^{34}Al + n using a Pb target at a relativistic energy 403A MeV is 78 mb *13*.

^{35}Al Levels

E(level)	J$^\pi$	Comments
0	(5/2$^+$,3/2$^+$,1/2$^+$)	J$^\pi$: From comparisons of measured differential Coulomb dissociation cross section of ^{35}Al breaking up into ^{34}Al in its g.s. and/or 46-keV isomer with theoretical calculations from the direct breakup model using the plane-wave approximation assuming the valence neutron at different orbitals. 2017Ch36 stated that the experimental data have been compared with the SDPF-M calculation and the comparison favors the ground-state spin and parity 5/2$^+$. Major configurations and spectroscopic factor for neutron deduced by 2017Ch36: (g.s.,4$^-$ in ^{34}Al)$\otimes\nu p_{3/2}$, spectroscopic factor=0.36 *9* + (46 keV,1$^+$ in ^{34}Al)$\otimes\nu d_{3/2}$, spectroscopic factor=1.47 *22* for J^π=5/2$^+$ of ^{35}Al g.s. For J^π=1/2$^+$ or 3/2$^+$ of ^{35}Al g.s., (g.s.,4$^-$ in ^{34}Al)$\otimes\nu f_{7/2}$, spectroscopic factor=1.03 *43* + (46 keV,1$^+$ in ^{34}Al)$\otimes\nu s_{1/2}$, spectroscopic factor=0.62 *7*. Other configurations for J^π=1/2$^+$,3/2$^+$ of ^{35}Al g.s.: (46 keV,1$^+$ in ^{34}Al)$\otimes\nu s_{1/2}$, spectroscopic factor=0.72 *8*; and (46 keV,1$^+$ in ^{34}Al)$\otimes\nu s_{1/2}$, spectroscopic factor=0.45 *7* + (46 keV,1$^+$ in ^{34}Al)$\otimes\nu d_{5/2}$, spectroscopic factor=0.94 *22*.