

In remembrance of Agu Aarna
Oil shale chemist and technologist



Without doubt the lifework of Agu Aarna carried out to promote oil shale industry in Estonia has raised the research in this field to the top of world science [1, p. 23].

Estonian oil shale industry did not emerge from emptiness. The honor of being the initiator of processing of this combustible natural resource belongs to Scotland, where James Young patented the method of getting paraffins and oils [2, p 18].

The year 1838 is considered the beginning of research on Estonian oil shale. In this year Member of Academy Helmersen described oil shale samples from Vanamõisa in “Mining Journal” published in St-Petersburg [2, p. 21].

Agu Aarna started his activity in oil shale research even before graduating from Tallinn University of Technology in 1948. His first publications dealt with investigations on improving methods for cleaning retort gas of tunnel ovens [3, p. 19]. Further developments in this field resulted in writing the candidate's thesis; he obtained the degree of candidate of technical sciences in 1948 already.

Scientific heritage of this outstandingly fruitful researcher deals with genesis, chemical composition, and thermal treatment of kukersite oil shale as well as chemical and technological properties of thermal treatment products. He with co-workers has published more than 100 papers [3]. His thoroughness led his passionate researcher's nature to ever deeper understanding of chemical processes.

We know that even in the middle of the last century oil shale chemists were convinced that the essence of thermal decomposition of oil shale organic matter (kerogen) is a gradual thermolysis, during which benzene fraction forms only at heavy oil cracking. Agu Aarna and his co-workers explained the chemism of oil shale thermal decomposition differently demonstrating that heavy oil and semicoke are the end products of the process. The knowledge is extremely important when designing technological equipment for oil shale processing. Even more – a detailed investigation of kerogen, its carbon-skeleton structure and functional groups was needed. The results obtained together with his co-workers E. Lippmaa and K. Urov were essential at optimizing the operation of industrial retort units.

Agu Aarna studied the composition and properties of shale oil for a long time [3]. The methods for determination of oxygen compounds in oil elaborated by his team are in general use even today. The developed analytical methods (incl. chromatographic ones) enabled to get a full picture of the distribution of oil shale oxygen-containing functional groups between phenol, carbonyl, carboxyl and so-called unknown functions.

Further research together with L. Mölder and E. Siimer enabled them to draw the conclusion that shale oil is a complicated polyazeotropic system with no major component.

At the beginning of the 1960s Agu Aarna together with K. Kiisler and P. Christjanson focused on investigation in the field of DFK resins. The original idea about carrying the reaction out in the presence of a complex former served as a basis for taking the next step directed to industrial production of DFK resins. The results were patented and put into use in several countries.

Considerable is the contribution of A. Aarna in the field of thermodynamics of solutions of autoassociating compounds (together with L. Mölder, E. Siimer, A. Suurpere, A. Viikna and others).

Being a prominent scientist, Agu Aarna was also a well-known science popularizer. He has written more than 200 popular papers dealing mostly with topical problems of chemical science and industry.

Such a rich scientific heritage in the field of an experimental science could not have arisen without brilliant organizing capacities. We can state that many of his prophetic ideas have been developed by contemporary analytical possibilities.

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1. A. Aarna. Estonian Soviet Encyclopedia. Vol. 1. – Tallinn: Valgus, 1985. 704 pp.
2. A. Aarna. Oil Shale. – Tallinn: Valgus, 1989. 142 pp.
3. Publications of Agu Aarna 1947-1975 / L. Mölder, I. Tali (Eds.). – Tallinn, 1975. 79 pp.