IMPROVING THE TECHNOLOGY OF PURIFICATION OF NATURAL AND SECONDARY GASES FROM SULFUR COMPOUNDS

Aripdjanov Oybek Yusupdjanovich,
Kholmatov Shokhrukh Furqat ugli,
Kayumov Jamshid Sayfullayevich
Tashkent Institute of Chemical Technology

ABSTRACT
Natural, organomineral, synthetic and composite sorbents are used to clean oil and gas from sour gases, the production of which is increasing year after year. Approximately 55% of which are used to purify natural and industrial gases from sulfur-containing organic compounds, mercaptans, carbonyl sulfide, carbon disulfide and other sulfur-containing compounds. At the same time, special attention is paid to the production of a new composite universal generation of these sorbents and technologies for their extraction and use.

Keywords: adsorption, absorption, nitrogen-containing water-soluble polyelectrolytes, absorption, amine plant, sulfur.

INTRODUCTION
The synthesis of new nanostructured composite sorbents used for the complete utilization of various wastes of oil and gas processing enterprises, the improvement of the technology for the purification of natural and tail exhaust gases from acid impurities, the increase in the stability of the physicochemical properties of sorbents, and the improvement of environmental conditions for the processing of secondary sorbents of oil and gas processing enterprises is an urgent task of today.

Based on this, ongoing research work is aimed at improving the physicochemical properties of sorbents. In addition, there are no studies in the literature on the thermochemical stability of composite absorbents based on nitrogen-containing water-soluble polyelectrolytes (NWSP). This is primarily due to the fact that absorbents of this type have not yet found wide distribution abroad [2–4].

MATERIALS AND METHODS
The objectives of the study are to modify the composition of diethanolamine and methyldiethanolamine with nitrogen- and amino acid water-soluble polyelectrolytes for gas purification from acidic components, followed by studying the effect of the created composite absorbents on the absorption and desorption of H2S and CO2 in gas.

Physicochemical properties of solutions were characterized by values of electrical conductivity measured by the generally accepted method and potentiometric titration.

Surface tension (G) of NWSP solutions was determined by method of the highest bubble pressure on Rehbinder device. Polymerization process takes 1.5-2 hours at the temperature range of 338-343K. This forms a white suspension with large polymer particles. Then, in the presence of formalin and VAT residue of furfuryl alcohol, the saponification process was carried out. In this case, the formed amide groups interact with furan compounds through formaldehyde, and the product obtained by this method is conventionally designated as FEAP-1 and FEAP-2.

RESULTS AND DISCUSSION

The IR spectra of FEAP polyelectrolytes produced based on Nitron fiber production waste and still residues of tetrahydrofurfuryl alcohol (THFA) showed a shift in the region of 1670–1700 cm–1 and 1300–1450 cm–1 due to C–CH2-R shift (where R-THFA) and hydrogen bonding. Absorption band in the region of 1220 cm-1, which is a characteristic of CH2 groups, and a wide absorption band in the region of 3000-3600 cm-1, which is common to -COOH- group and hydroxyl, increases due to binding of -CH2-R, formation of bridges through formalin. There is also a new broad absorption band in the region of 1110-1300 cm-1, which is specific for alcohol hydroxyls
(-CH2OH) and carboxyls (-COOH).
To study the composition and characteristics of the obtained polyelectrolytes "FEAP-I" and "FEAP-2", some physico-chemical methods of analysis were applied. Table 1 shows the chemical composition of nitrogen and amine-containing water-soluble polyelectrolytes.

Table 1. Chemical composition and some other characteristics of nitrogen and amine-containing water-soluble polyelectrolytes

No.	Polymer name	Element content, %					Conten, mg		Acid number, mg KOH	Viscosity of 1% solution
		Carbon	Hydrogen	Nitrogen	Sulfur	Oxygen	Na_2O	CO_2		
1.	FEAP-1	41.15	4.12	7.85	-	42.95	7.15	5.35	466	20-30
2.	FEAP-2	47.65	3.65	2.70	-	33.45	13.27	5.12	495	12-25

The data given in table-1 prove that the use of composite absorption solutions in the purification of natural gas from acidic components with the absorbent MDEA+NWSP leads to an improvement in their operational technological properties. At the same time, the quality of gas purification from acidic components remains within the normal range; -H2S in m3-7 mg, -CO2 in m3-0.51 g.

CONCLUSION

Based on the obtained results of the tests, it can be generally concluded that adding NWSP composite solutions to MDEA working solutions improves technological characteristics of gas absorption purification process and have a significant impact on the improvement of the environment.

REFERENCES

1. Aripdjanov O., Tirkasheva X. Increasing and intensification of the technology of purification of natural gas by composite absorbents // E3S Web of Conferences Volume 25820 May 2021 Article number 120082021 Ural Environmental Science Forum on Sustainable Development of Industrial Region, UESF 2021.

2. Lunin A.F., Husejn A., Burdejnaya T.N. Utilizaciya serovodoroda iz kislyh gazov aminovoj ochistki. // Himiya i tekhnologiya topliv i masel. -2001. №12 – pg.13.

3. Hall P.D. Corrosion innibition in alkanolamine acid gas removal Plants // Doklad na prezentacii kompanii «Dow Chemical» Moscow-1980. Pgs. 24-26.

4. Gerasimenko M.N., Bryukhov A.V., Isaev A.V. Orenburg Gazprom. Problemy and perspective processing of natural gas and OGZ. // Gazovaya promyshlennost. -2001. - №6. - p. 29-31.