

## Summaries

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**Experimental Determination of Influence of Refrigerant Selection on Thermal Power of Compression Refrigerator** • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2006

In this article a problem of air-cooling efficiency by using mine compression refrigerator is presented. Experimentally, a thermal power of evaporator was defined, as figure of cooling merit. Measurements were carried out on test stand for refrigerator work with three different pro-ecological refrigerants – R404A, R407C and R507. For that purpose, it was achieved the measurements of temperature and humidity of air before and after cooling, and rate of air flow through evaporator. In amount, cooling of air in 108 different variants were studied – 36 for each mentioned refrigerant. Particular variants of studies were differed in input conditions – state of cooling air and rate of air flow. Making measurements for different refrigerants were kept up equal input conditions in suited variants. Temperature of air before evaporator was kept up on three levels, its relative humidity – on three levels, too, efficiency of flow – on four levels. Results of those studies in form of thermal power of evaporator, which was enumerated on the basis of measurements, are presented in table, whereas on charts are shown separately results for each flow efficiency. Obtained results of studies allowed to estimate a quality of air cooling by refrigerator in dependence on using refrigerant.

**Keywords:** ecological refrigerants, mine air conditioning, cooling of air, power of compression refrigerator

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**Binary Character of Surface of Coal** • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2006

Actual views on structure of coal and chemical character of its surface, taking into consideration electron-donor and electron-acceptor centers, were reviewed. The influence of the character of surface layer together with its hydrophilic sites, which are responsible for wetting of coal, was demonstrated. The number of such sites fundamentally influences the number of adsorbed water molecules and it decreases with the C content in coal. The hydrophobic fragments present on coal surface are of great importance for sorption of vapours of both aliphatic and cyclic, non-aromatic hydrocarbons. Such hydrocarbons are connected with apolar fragments of coal structure by dispersion forces. During sorption of aromatic hydrocarbons, such as benzene and its alkyl derivatives, additionally to dispersion forces, interactions with  $\pi$  electrons in aromatic rings must be taken into account. Adsorbates with both apolar groups, such as alkyl radicals, and polar groups, e.g. –OH and –COOH, cannot differentiate between hydrophilic and hydrophobic centers on coal surface.

**Keywords:** coal, surface groups, sorption

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**Economic Utilization of Methane from Coal Bed Drainage in Polish Hard Coal Mines** • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2006

Methane occurs in coal exploitation for the sake of explosion is the biggest threats for mining crew's and for production. In coal mines basic method for reduce methane threats are:

- intensive ventilation of excavations,
- drainage.

Methanated in polish coal mines is very high, in year 2004 — 825 m<sup>3</sup> CH<sub>4</sub>, drainage — 250 m<sup>3</sup> CH<sub>4</sub> [10]. Coal bed methane is move by ventilation process from underground to the atmosphere. Methane moved by ventilation process, and drainage in view of lack possibility for full use, cause greenhouse effect unprofitable ecological effect. Methane from drainage can be use as low concentration fuel for heat plant, eg. gas turbine, gas engines, heat boilers. In Poland low concentration methane is use in a lot of plants e.g. Jastrzębie Coal Company, but global economical index is only 53%. Analyse show possibility of use low concentration methane from coal bed drainage, but necessary is take activity in following ranges improvement of use low concentration methane from coal bed drainage (still about 42% methane is send to atmosphere) as fuel for: gas burners carbon boilers, carbon boilers, gas engines for heat and electrical power. Accustoming on industrial scale installation and technology for clean-up of gas from drainage, there be air-methane mixture, from air, that will allow to get fuel about business parameters (96% CH<sub>4</sub>) for general application in gas installations. Limitation of methane emission from coal bed in mining process by use intensive drainage systems, but indispensable condition is possibility of use low concentration methane as fuel in heat and electrician plants.

**Keywords:** *methane, drainage, coal mines, coal mines ventilation, methane utilisation*

*BOGUSŁAW PTASZYŃSKI*

**Models of Air Mixing in a Mine Working** • Kwartalnik Górnictwo i Geoinżynieria • z. 2, 2006

The paper presents the transient function  $F(t)$  and the weight function  $E(t)$  for the chosen, most commonly applied models of air transfer in mine workings. The knowledge of these, the first one in particular, may be practically utilized to better map the actual mass transfer in the working.

**Keywords:** *mass transfer model, air flow in mine workings, transient function, weight function*