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## Study of water sorption into magnetic coordination networks

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The possibility of inducing structural and magnetic changes by sorption of guest molecules is one of the important aspects of molecular magnetic materials that make them different from classical magnets based on metal alloys or oxides. This so called solvatomagnetic effect may find potential application in the design of molecular switches or sensors. It also provides valuable insight into the relation between magnetic superexchange and subtle structural features, like bonding geometry and supramolecular interactions.

Within the scope of our research, focused on magnetic CN-bridged bimetallic assemblies, we have developed an efficient synthetic strategy leading to structurally flexible networks and obtained a series of solvatomagnetic compounds of different dimensionality and topology. These include several microporous networks, which can accommodate water or methanol into their open framework, and change their structure and magnetic properties depending on the type and quantity of guest molecules [1,2]. We have also obtained non-porous chain structures which undergo partial dehydration, usually in a reversible process. In these coordination polymers rearrangement of hydrogen bonds causes magnetic changes [3], and in some cases a very rare and interesting additional effect of metal-to-metal charge transfer occurs [4].

The study of different solvates poses a considerable challenge. It is particularly difficult for compounds with pronounced structural flexibility, where several pseudo-polymorphic forms may exist with the same guest molecules under slightly different conditions [2]. In order to study structure and magnetic properties it is crucial to establish the temperature and partial pressure ranges in which each form is stable. The widely used volumetric methods dedicated to sorption studies are not particularly suited for this purpose. Therefore, we have developed an original method in which the sample is exposed to constant flow of carrier gas with solvent vapours. Under variable temperature conditions the de-solvation and re-solvation processes can be observed as changes in the partial pressure of the vapours which pass through the sample. By using this method we have detected a multi-step dehydration for two microporous networks.

### References

- [1] B. Nowicka, M. Reczyński, M. Rams, W. Nitek, M. Kozieł and B. Sieklucka, *CrystEngComm*, 2015, **17**, 3526-3532.
- [2] B. Nowicka, M. Reczyński, M. Bałanda, M. Fitta, B. Gawel and B. Sieklucka, *Cryst. Growth Des.*, 2016, **16**, 4736-4743.
- [3] B. Nowicka, M. Heczko, M. Reczyński, M. Rams, B. Gawel, W. Nitek and B. Sieklucka, *CrystEngComm.*, 2016, **18**, 7011-7020; B. Nowicka, M. Heczko, M. Rams, M. Reczyński, B. Gawel, W. Nitek and B. Sieklucka, *Eur. J. Inorg. Chem.*, 2017, 99-106.
- [4] B. Nowicka, M. Reczyński, M. Rams, W. Nitek, J. Żukrowski, C. Kapusta and B. Sieklucka, *Chem. Commun.*, 2015, **51**, 11485-11488.

**Author:** Dr NOWICKA, Beata (Jagiellonian University)

**Co-authors:** Prof. SIEKLUCKA, Barbara (Jagiellonian University); Mr RECZYŃSKI, Mateusz (Jagiellonian University); Dr MAKOWSKI, Waław (Jagiellonian University)

**Presenter:** Dr NOWICKA, Beata (Jagiellonian University)

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