that papers in chemistry and biology will get far more citations than those in engineering and mathematics. A fairer assessment, from a due diligence point of view will be to propose a normalized second-order indicator, $X^* = (i/I)^2 P$, where I is the baseline impact for each field. When this is performed, the results change drastically. Chemistry's share drops to a modest 21.5%. Engineering's share rises to nearly 20%, and if computer science and space science are considered as part of the engineering discipline, the share rises to 22.5%. And mathematics accounts for a respectable 1.73%.

What does all this mean for the institution of the Bhatnagar Prizes? Table 2 shows a re-organization of the data into what could become the new and more rational way of awarding these highly coveted prizes. It is clear that materials science is emerging as an independent field in which the quantum of contribution to India's output is significant. This could be the eighth area in which the Prizes could be instituted. I propose that two prizes be continued every year in chemistry, physics and engineering. Only one needs to be awarded every year in medicine, biology and materials science respectively. The Prize in geosciences and environmental sciences needs to be awarded only once every two years. Mathematics, the queen of the sciences, needs to be crowned only once in five years.

1. Prathap, G., *Curr. Sci.*, 2010, **98**, 995–996.

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Uranium exploration

I have read the paper entitled 'Calcrete-hosted surficial uranium occurrence in playa-lake environment at Lachhri, Nagaur district, Rajasthan, India' by Mishra *et al.*[1].

I have been involved in the analysis of geological materials and hydro-geochemical reconnaissance surveys attached with mobile geochemical laboratories in different parts of India for uranium exploration activities of the Atomic Minerals Directorate for Exploration and Research. Based on my experimental work on the analysis of water samples received from different areas/exploration projects, I would like to share some of my observations.

There are two statements in the paper by Mishra *et al.*[1]. (i) There is a one-line statement in the abstract (p. 84) and also in the text (p. 87): 'At Lachhri, the uranium value in the groundwater sample is 333 ppb.' (ii) The other statement (p. 88) reads: 'The high content of uranium in the groundwater samples from Lachhri and adjacent areas and also in the country rocks around Lachhri presents a favourable scenario for uranium mineralization in calcretes of the area.' What is the reliability of the first statement? The details of sampling[2,3], number of samples, detailed composition of samples (major cations and anions, fluoride), time interval between water collection and analysis, and methodology adopted for analysis[4], are not included in the paper[1]. Moreover, there are other important parameters also, such as uranium/conductance ratio which has not been mentioned; this is a significant aspect in ascertaining the potential of uranium presence in hydro-geochemical samples. As stated in the paper[1], the water samples are from the saline zone. However, total salinity values are not given. Total alkalinity values, which are indicators of uranium mobility owing to their role in complexation of uranyl ion (UO_2^{2+}) in aqueous phase, are also not stated. pH values of water samples which are of prime importance in hydro-geochemical movement of uranium and their leaching out from their sub-strata are also missing. The major, minor and trace elements present in hydro-geochemical samples play a major role in characterizing the strata given below the water table. The presence of fluoride may significantly affect the changes in uranium content[5–8].

In general, laser-induced fluorimetry as field technique is used for measurement of uranium in naturally occurring water samples. Since these highly saline water samples require sample preparation, the high uranium content in such samples needs to be validated by conventional fluorimetry technique and level of variation, if any, have been documented. The reliability/quality of measurement results of water samples depends on strict adherence to each step of sampling, preservation of samples, time interval between sampling and analysis for filtered but unacidified water samples, and on the methodology adopted, and not simply analysed by any person, laboratory or technique[5–8].

The higher uranium content in lake water samples may be because of 'evaporative pre-concentration'. All these parameters need to be included and properly documented.

1. Mishra, A., Pande, D., Ramesh Kumar, K., Nanda, L. K., Maithani, P. B. and Chaki, A., *Curr. Sci.*, 2011, **101**, 84–88.
2. APHA, *Standard Methods for the Examination of Water and Waste Water*, American Public Health Association, Washington, 1992, 18 edn, pp. 1–8-1–23.
3. Pazand, K. and Hezarkhani, A., *Appl. Water Sci.*, 2013, **3**, 479–489.
4. Rathore, D. P. S., *Talanta*, 2008, **77**, 9–20 and references therein.
5. Rathore, D. P. S., *J. Radioanal. Nucl. Chem.*, 2013, **298**, 717–719, 721–723, 727–729 and reference therein.
6. Rathore, D. P. S., *J. Geol. Min. Res.*, 2013, **5**, 108–113.
7. Rathore, D. P. S., *Hum. Ecol. Risk Assess.*, 2013, **19**, 1147–1149.
8. Rathore, D. P. S., *J. Public Health Epidemiol.*, 2013, **5**(3); DOI:10.5897/JPHE2013.0517.

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