ASSESSMENT AND MODELLING OF ADSORBENTS FOR LOW BURDEN RESPIRATORY PROTECTION

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In recent years the spectrum of potential chemical threats faced by the military has broadened significantly to encompass a wide range of toxic industrial chemicals (TIC s). This places greater demands on the filtration capabilities required from the respirator canister in order to provide the wearer with clean air to breathe. Countering this is a desire to reduce the burden on the respirator wearer. Dstl is carrying out research into adsorbents which can offer a range of protection / burden levels. These include carbon monoliths carbon cloths and carbon loaded polymers as well as more conventional granular carbons. Experimental data will be used to illustrate some of the potential benefits of these materials. The importance of testing under realistic conditions (e.g. breather flow variable concentration) will also be discussed in terms of its impact on assessing low burden filtration options. Filter performance is influenced by such a wide range of parameters that modelling is essential in assessing the adsorbents and the level of protection they might provide under realistic conditions. Dstl is applying a range of modelling approaches to this research. These include the classical Wheeler-Jonas breakthrough model widely reported in the literature as well as computational fluid dynamics based modelling. Recent studies have focussed on the development of filter performance models which can be linked with the Dstl dispersion modelling capability to enable assessment of virtual canisters under a wide range of exposure scenarios.