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Plasma Isotopic Change over Experiments in JET under Carbon and ITER-like Wall Conditions

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In ITER, isotopic exchange by deuterium could be envisaged as a method for minimising the tritium inventory in the vessel. In JET ITER-Like Wall (JET-ILW) an isotopic plasma wall changeover experiment has been carried out to determine the amount of particle accessible by changing the plasma from H to D. The results of this series are presented and discussed in this paper.

Starting with a wall devoid of D2 and preloaded in H2, change over experiments from H2 to D2 has been carried out in JET-ILW. 13 repetitive pulses have been performed under conditions of: $I_p=2.0\text{MA}$, $BT=2.4\text{T}$, $\langle n_e \rangle = 4.5 \times 10^{19} \text{m}^{-3}$, a gas injection of $6.0 \times 10^{21} \text{Ds}^{-1}$ and 0.5MW of ICRH. During the plateau phase, the strike points were moved from vertical to horizontal divertor targets.

The gas balance analysis integrated over the experimental session shows that the total amount of H removed from the wall is in the range of $1-3 \times 10^{22} \text{H}$. The H concentration is shown to be lower than 10% in the plasma after 4 pulses and below 4.5% after 13 pulses. These results are compared with the T-D change over experiments performed during the DT campaign in JET-C which exhibits an amount of T removed from the wall of $2 \times 10^{23} \text{T}$ with 10% of T concentration after 10 discharges.

Finally, evaluation of isotopic plasma wall changeover as a method for minimising the fuel inventory in full metallic devices like JET-ILW and ITER is discussed.

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