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Cavity Formation under Top Blowing on Liquid Bath at Various Gas and Bath Composition

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For the purpose of obtaining further information on decarbulization blowing with oxygen jet in BOF, a course of study on cavity formation with water model was carried out using CO₂ gas as a dissolving gas. Ar gas, CO₂ gas, or a mixture of them was blown from a lance onto aqueous bath of various composition. The cavity formed under CO₂ blowing was larger compared to that under Ar blowing of the same flow rate, beyond the difference of gas density. Such behaviour would reflect that dissolving reaction proceeds the cavity formation. The cavity depth formed under Ar and CO₂ blowing onto aqueous surfactant solution was slightly larger compared to those on ion-exchanged water. In the case that CO₂ was blown onto aqueous surfactant+NaOH solution, the cavity became much deeper. Such results suggest that decrease in surface tension would help cavity formation, and what is more, dissolving reaction of gas would exceedingly promote the cavity formation. Those consideration corresponds to the classical findings that interfacial tension may lower under transfer of component between two phases, such as the increase in interfacial area between molten slag and metal droplet during desulfurization reaction.

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