Review of “Influence of adsorption of CO2 on cylinder and fractionation of CO2 and air during preparation of a standard mixture” by N. Aoki et al, AMTD.

General:

The manuscript presents new updated CO_2 concentration (and auxiliary) measurements regarding fractionations associated with adsorption/desorption on metal surfaces as well as fractionations during decanting experiments (mother-daughter, dilution experiments). These fractionations, in particular the latter, are relevant for assigning concentration and isotope values as best as possible as it significantly changes the concentration values. Aoki et al., did a thorough experimental study combined with explanations using models that has been used earlier on. Their results clearly show that care must be taken during dilution and decanting (mother-daughter) experiments.

This manuscript deserves publication in AMT after the manuscript has been checked for English language shortcomings as mainly addressed by Reviewer 1 and additionally outlined below.

Minor points:

Title: consider changing to: Influence of CO2 adsorption on cylinders and the fractionation of CO2 and air during the production of a standard mixture

Abstract: We conducted a study to fully understand carbon dioxide (CO2) adsorption
I do not know whether you should write it in such an absolute manner, consider skipping fully or exchange it with better.

Abstract: The CO2 molar fractions in standard mixtures prepared by diluting pure CO2 with air three times deviated by −0.207 ± 0.060 μmol mol−1 on average from the gravimetric values which were calculated from masses of source materials by evaluating their CO2 molar fractions based on standard mixtures by diluting the pure CO2 with the air only once.
This sentence is difficult to understand, consider splitting it up.

Abstract: rewrite: When the cylinder pressure was reduced from 11.0 to 0.1 MPa, the CO2 mole fractions in the mixture stream exiting the cylinder increased by 0.16 ± 0.04 μmol mol-1.

Intro: However, the compatibility goal has not been achieved among laboratories using their scales (Tsuboi et al., 2017, Flores et al., 2019), preventing precise evaluation of sources and sinks of CO2.

Here, I agree with Reviewer 1. Your conclusion is indeed misleading as the accuracy within the WMO GAW network does not play role as all the values needs to be reported on the same scale. The accuracy of the scale itself is of second-order. Your cited references document differences among different scales in use. Please reformulate this part.

Line 105-106: The mixture flow after through the regulator was branched to two ways by T-pieces. T, rephrase to “After flowing through the regulator, the mixture flow was branched in two ways by T-pieces.

Line 141: ….(N2+O2,+Ar+CO2=1). Use ….(N2+O2+Ar+CO2=1)

Line 507-510:The fractionation factor in the transfer of the CO2/Air mixture was 0.99968 ± 0.00010, indicating that the CO2 molar fraction decreased by 0.032 % ± 0.010 % by transfer of a source gas and the CO2 molar fraction in a source gas increases by 0.30 ± 0.10 μmol mol−1 as the inner pressure decreased from 11.5 MPa to 1.1 MPa.
rephrase this sentence.

Fig. 4: refer to subgraphs a), b) and c) in the Figure legend